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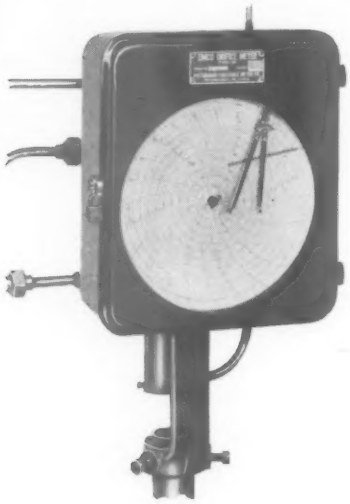

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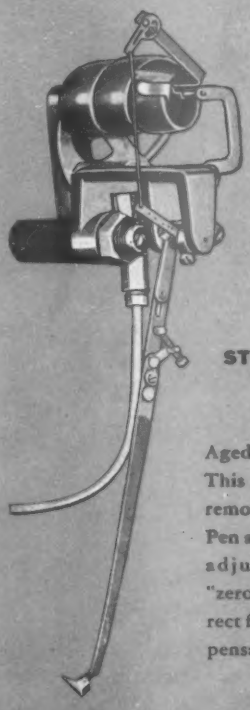

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The OIL AND GAS JOURNAL

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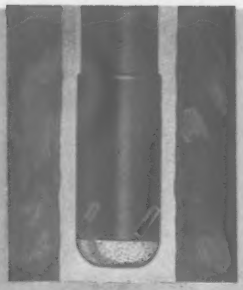
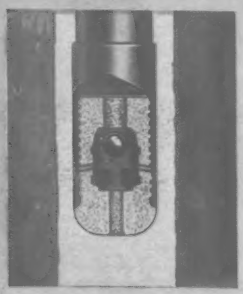


• It will safely guide and float the longest and heaviest string of casing.



• It has a positive acting *Ball-Type* Back Pressure Valve.

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Product No. 121
Baker Cement Whirler Float Collar with Solid Bottom Baffle with Metal "Petal" Basket
Product No. 306

the OIL AND GAS JOURNAL

Trends

Crude-Oil Production
By States—Page 134

CRUDE-OIL STOCKS 221,310,000 bbl. as of January 27—down 336,000 bbl. One year ago 240,251,000 bbl.

GASOLINE STOCKS 89,223,000 bbl. as of January 27—up 515,000 bbl. One year ago 80,917,000 bbl.

RESIDUAL FUEL-OIL STOCKS 51,119,000 bbl. as of January 27—down 1,435,000 bbl. One year ago 52,980,000 bbl.

GAS OIL AND DISTILLATE STOCKS 33,651,000 bbl. as of January 27—down 1,390,000 bbl. One year ago 37,251,000 bbl.

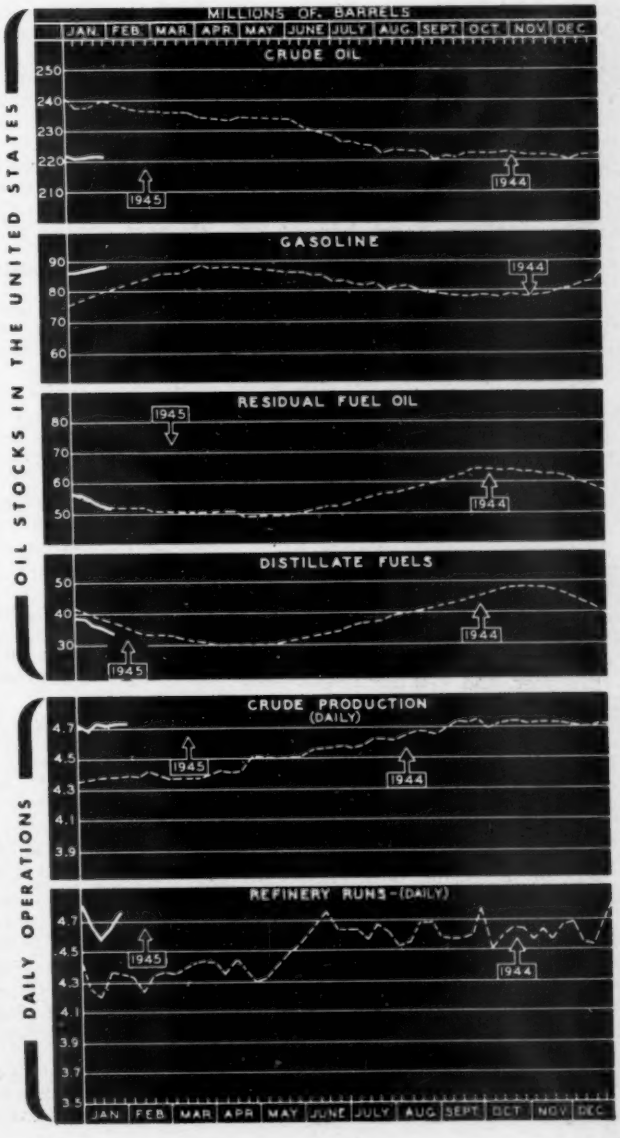
CRUDE-OIL PRODUCTION 4,733,300 bbl. as of February 3—down 3,400 bbl. One year ago 4,395,790 bbl.

REFINERY RUNS 4,756,000 bbl. daily week ended January 27—up 70,000 bbl. One year ago 4,364,000 bbl.

THE oil industry in the United States last week completed the first month of what has been termed "an all-out war year for petroleum" with actual production closely paralleling the requests of military and civilian agencies. Any shortages in supplies reflected weather and transportation conditions. Crude-oil production for the first 34 days of the new year averaged 4,716,400 bbl. daily, an increase of 6.6 per cent over the comparable period last year. This means that domestic fields are starting at a yearly rate of 1,725 million barrels. This does not include approximately 110 million barrels of natural gasoline and associated products, which when added to the crude-oil output, point to an average daily output of liquid petroleum this year slightly in excess of 5 million barrels daily. The 5 million figure represents an accomplished objective in domestic operations which was projected in the early days of this country's participation in the war.

TRENDS in refinery operations are similar to those in field output. For the first 4 weeks crude runs to stills at domestic refineries averaged 4,667,000 bbl. daily, an increase of 376,000 bbl. or 8.7 per cent greater than in the same period in 1944. When the natural-gasoline plant output is added to these crude runs to stills it is apparent that practically all of the liquid petroleum being produced in this country is also being processed here. An undisclosed quantity of South American crude oil is being refined at domestic refineries.

THE government itself, in a summary of petroleum conditions, last week agreed that these field and plant activities represent near-capacity operations. Operators will concur with that conclusion. Although reports indicate an unused refinery capacity of around 200,000 bbl. daily, investigators state that this is not a reflection of actual war conditions. Refiners measure capacity at this time on the basis of maximum output of war and essential civilian products, and on that basis practically no refiners could expand present operations. The exception ordinarily would be the smaller skimming plants, which could top more crude oil if crude oil of the desired properties could be transported long distances. It is stated that only sour crude could be made available, and this is largely nonrefinable at these skimming plants.



Gasoline, Tire, Car Restrictions To Continue Through 1945

WASHINGTON. — The Office of War Information last week told the American public some stern facts about gasoline, automobile, truck and tire supplies for 1945. The report, based on information from various government agencies, pointed to the superb record of the petroleum industry in reaching all-time high output rates, but warned that at best consumers can expect no more gasoline than they get today.

Certified production of all petroleum liquids for February hit a new high of 5,074,850 bbl. daily, an increase of 34,050 over January certifications, OWI said, but military demands have expanded along with production. Subsequently all U. S. and United Nations oil fields are operating at maximum efficient rates.

Currently, transportation is tighter than supply, OWI said. Every car, barge, tanker and pipe line is being used to capacity, but military demands are making movement of civilian supplies more difficult. The entire pipe-line system, which moves more petroleum into critical areas than any other type carrier, will continue to operate at top capacity through 1945. Of 145,000 tank cars in use, 115,000 handle petroleum products. This fleet loses about 75 cars a month through complete depreciation, accidents or breakdowns, and lack of 600 repairmen is keeping several thousand cars out of service awaiting maintenance.

Slight Encouragement Offered

Some encouragement is offered in the fact that increased gasoline supplies for use abroad are expected from the Near and Middle East late this year, and V-E day might bring some surpluses if military demands slacken. However, such surpluses, if any, might not reach the private driver, since relaxation of rationing must be contingent upon other factors than the supply of gasoline. Because of the shortage of tires, parts and new vehicles, there is little prospect of increasing ODT claims for civilian gasoline for the nation's 22,800,000 A and 14,400,000 B and C drivers.

Gasoline consumption has been running above allocations, OWI pointed out, cutting into reserve stock. An additional factor, it was explained, lies in growing military demands for tankers, some to be used as floating storage facilities.

Overall cut in gasoline for civilian use since the war started is 33⅓ per cent, but with commercial and farm vehicles receiving normal or abnormal volumes, the civilian driver has been cut below that average.

The situation on other transportation factors was summarized as follows:

Tires for civilian trucks and buses will run short, and probably be rationed only to Priority 1 vehicles. The situation would be far more acute, OWI said, had it not been for the fact that a highly competitive market in 1941 resulted in over selling, leaving substantial stocks on hand.

Although synthetic rubber production for 1945 is scheduled above 1,000,000 long tons, military needs for heavy-duty tires are up 30 per cent. Present indications are that only about half the essential commercial - transportation tire needs will be met during the first quarter, and for the passenger driver, the shortage may be acute.

Tire Bottlenecks

Bottlenecks in tire production include rayon cord, requirements for which will not be met. Smaller truck tires will have to be made with cotton cord, which in turn vies with Army tentage requirements. Crude-rubber supplies are down to 98,000 tons. The chief note of encouragement lies in the $70,000,000 government financed expansion program for truck tire manufacturing facilities, which will add about 25 per cent to the nation's total capacity.

The 1945 production program calls for 869,212 trucks, 60,000 above the 1944 schedule. However, less than one-fourth of the trucks estimated as needed for essential use this year will be made.

With no chance of new passenger-car manufacture in 1945, and with cars disappearing from the highways at a rate of 4,000 a day, tighter rationing of the 12,000 stockpile of 1942 cars is foreseen. A postwar demand for 12,000,000 to 15,000,000 cars is considered likely.

Bus production looks somewhat better, but falls short of meeting the demand forced upward by increase of transportation loads in war-producing centers from 25 per cent to 250 per cent. The 1944 schedule calls for 10,000 buses, nearly double 1944's total of 5,087. Prospects for labor in bus production are somewhat better, but 6,000 workers are needed now in machine shops, plants producing end products and in assembly plants.

Reporting of export quotas for 1944 on some items, OWI pointed out that gasoline exports (both lend-lease and commercial sales but excluding military use) amounted to 15,700,000 bbl. Foreign Economic Administration shipments of truck and bus tires for the first 10 months in 1944 were 1,488,819 and for passenger cars during the same period, 125,965.

Corrections Made in Stripper Well Listing

WASHINGTON. — Defense Supplies Corp. last week issued several corrections to the revised stripper well compensatory adjustment regulations.

The following changes in cents per barrel should be made in the listing as it appears in Office of Price Administration RMPR 436 (Amendment 6, Nov. 3):

Indiana — Price increase for St. Francisville, Knox County, should be 35, not 25; increase for St. Francisville East, Knox County, should be 20 not 35.

Kansas—New Albany pool is in Elk, not Wilson County; Van Hoy, Coffee County, should be Van Noy.

Michigan—Mt. Pleasant and Extension, Isabella County should be listed as Mt. Pleasant and East Extension.

Oklahoma — Colinsville, Tulsa, should be spelled Collinsville; Hoffman, Pottawatomie, should be Huffman; increase for Milroy (shallow), Stephens and Carter counties, 35 not 25.

Texas — Galley pool, Winkler County, should be Halley pool; Richards pool should be listed in Pecos County.

Montana Considering Compact Membership

DENVER.—The Montana Oil Conservation Board, following a canvass of the industry, has appointed a committee to draw up a bill to be presented to the Montana legislature empowering the state to join the Interstate Oil Compact. The committee is composed of G. S. Frary, R. P. Jackson and L. C. Donovan.

A bill also has been introduced in the Wyoming legislature designating the governor as Wyoming's representative on the commission with an assistant to attend the meetings. It provides that nothing in the act shall be construed as granting any power to prorate, allocate, regulate or control oil or gas production or marketing thereof without the consent and approval of the legislature. The Montana bill will contain similar reservations.

Theorists' Dabbling in Charting Industry's Future Scored by Zook

LOS ANGELES. — Sharp criticism was leveled here this week against the "theorists, bureaucrats, and self-appointed planners who would supply the postwar oil requirements of this country from Venezuela, Iran, Iraq, Bahrein, Kuwait and Saudi Arabia". The "dreamers and idealists" were excoriated by Ralph T. Zook, president of the Independent Petroleum Association of America, who addressed Pacific Coast operators at a meeting here February 6.

The price of oil and imports, Zook declared, are the two outstanding problems confronting the independent producer and the strictly domestic companies.

"Higher crude prices," Zook said, "will go far towards assuring a greater supply of oil for the war and a healthy, dynamic postwar industry. A strong oil industry: (1) guarantees the security of this nation in time of war; (2) assures the public of a continuous and adequate supply of oil and products at fair prices; (3) allows the states' natural resources to be released in an orderly manner, and (4) furnishes the production branch of the oil industry with necessary funds to accomplish these results.

"There are some who are ready to write off the United States as a strong producing nation and depend on the importation of foreign oil. Others are planning to use the greatest oil market of the world, the United States, to cure the ills of other countries at the expense of our country. The independent producer sees in such thinking a definite threat to his existence.

"If we were to buy all of our requirements from the cheapest source, there would be very little earning power remaining since most goods would come from abroad where wages are but a fraction of that paid in the United States. There is no more logic in saying that our oil should be produced in Venezuela than to say that our steel should be produced and furnished in Mexico, our silver and zinc in South America, our wheat grown in Canada, and our beef supplied from Argentina.

"The consumer of petroleum could readily be harmed rather than helped from such a program. Those few companies who are large domestic producers also hold the largest reserves of foreign oil. They could readily supply their part of the billion barrels of imported oil at an attractive profit from their foreign holdings. The producers, refiners, and marketers who depend on domestic oil would no longer furnish the competition which has made petroleum products one of the greatest dollar values of any commodity purchased by the citizens of the United States. In countries where competition is lacking, petroleum products cost at least 30 per cent more than in this country.

"The domestic oil industry has been on a starvation diet of inadequate price, manpower and materials. Before planning its demise it would be well to turn it loose and give it an opportuntiy to demonstrate its ability to replace reserves depleted during the war and rebuild the nation's producing capacity."

Refinery Cost Committee to Advise OPA on Current Study

WASHINGTON. — Plans for the study of refinery operating costs will be inaugurated here March 15 at a meeting of representatives of the Office of Price Administration and of 22 refining companies. The meeting with refiners will presumably follow the pattern established in OPA discussions last month with the industry's crude-oil price advisory committee.

Most refiners assert that the manufacturing end of the industry could not absorb higher crude prices at the current ceilings on civilian products. It is admitted that a few war plants which are manufacturing predominantly military products are showing substantial profits. Equally strong arguments are advanced that a numerical majority of the nation's refiners are operating on no more than a reasonable margin, and some plants have barely stayed above the line of economic necessity.

The Petroleum Industry War Council and the Petroleum Administration for War, both supporting higher crude prices for many months, have argued that compensatory upward adjustments of product-price ceilings should accompany increased costs of crude oil. Transportation, insufficient repair and maintenance materials and shortages of manpower have been factors lifting the costs of refiners during the war period. Stabilized price ceilings, eliminating the normal variations caused by seasonal conditions have only partially offset rising costs. Wide differences in refinery-cost-accounting methods prevalent in the industry, authorities assert, will add measurably to the difficulty of establishing standards in this end of the industry. Local conditions are the chief variables, refiners point out, in determining the economics of individual-plant operations.

Committee Members

Members of the refinery advisory committee invited to discuss the cost situation with OPA are:

W. S. Zehrung, president, Pennzoil Co.; W. H. Bennett, vice president, Frontier Fuel Oil Corp.; Paul G. Blazer, chairman, Ashland Oil & Refining Co.; Max M. Fisher, vice president, Aurora Gasoline Co.; C. L. Henderson, president, Vickers Petroleum Co., Inc.; John W. Boatwright, manager sales research, Standard Oil Co. (Indiana); D. P. Hamilton, president, Root Petroleum Co.; Roland V. Rodman, vice president, Bay Petroleum Corp.; C. A. Johnson, chairman, Socal Oil & Refining Co.; W. H. Beekhuis, assistant comptroller, Standard Oil Co. of California; L. T. Cramer, manager, sales administration, Continental Oil Co.; Sidney A. Swensrud, vice president, Standard Oil Co. of Ohio; B. L. Majewski, vice president, Deep Rock Oil Corp.; Neil Buckley, vice president, Taylor Refining Co.; R. L. Tollett, president, Cosden Petroleum Corp.; Stewart P. Coleman, economics department, Standard Oil Co. (New Jersey); Horace G. Dale, manufacturing department, Shell Oil Co., Inc.; C. F. Salzer, assistant general auditor, Gulf Oil Corp. and Gulf Refining Co.; William L. Stewart, Jr., executive vice president, Union Oil Co.; J. S. Worden, manager refining operations, The Texas Co.; M. E. Foster, Phillips Petroleum Co., and Harry H. Fuller, manager bulk sales, Sinclair Refining Co.

Drilling Suspended on Prince Edward Test

NEW YORK.— Drilling has been suspended until spring on the Prince Edward Island wildcat test of Socony-Vacuum Oil Co., Inc. and Cities Service Oil Co. 1 Hillsborough. Drilling will be resumed in the spring at around 12,000 ft., current depth of the test.

Seven Operating Firms Form Elk Basin Unit

DENVER.—An operating trend which appears to be gaining wide favor was furthered here last week with disclosure that seven companies holding about 6,000 acres in the Elk Basin field, Wyoming, had established a unitized development and production program.

Determination of the participating percentages will be adjusted as new development occurs, overcoming one of the obstacles to early unitization before final values of individual properties are established by extensive drilling.

Participating in the new Elk Hills unit, formation of which awaits formal approval by the Interior Department, include: Continental Oil Co., Ohio Oil Co., Carter Oil Co., Sinclair Wyoming Oil Co., Phillips Petroleum Co., MacKinnie Oil & Drilling Co., and Stanolind Oil & Gas Co., which will be the operating organization.

Ultimate production for acreage assigned to the unit has been estimated at 120,000,000 bbl., approximately 30 to 40 per cent of the total recoverable oil in the field.

The United States Geological Survey will act as umpire on engineering problems involving operations on government land.

Chemical Society Cancels Annual Spring Meeting

The annual spring meeting of the American Chemical Society, largest organization of professional chemists in the world, will not be held in 1945, it is announced by Dr. Charles L. Parsons, secretary of the society, following action by the board of directors.

Practically the entire membership of the society is engaged in essential war work, it was explained by Dr. Parsons, who expressed the society's desire to cooperate fully with the government in meeting difficulties of transportation.

Continental Offers $46.50 a Share for Navarro Stock

PONCA CITY.—Continental Oil Co. is making an offer to the stockholders of Navarro Oil Co. of Houston, to purchase the stock held by them at $46.50 per share, it was learned here this week. The offer is conditioned on stockholders of Navarro selling, in the aggregate, not less than 80 per cent of the outstanding stock consisting of 348,919 shares without par value. A circular letter has been mailed to stockholders of Navarro setting forth the terms of the offer under which they will have until the close of business March 1, to assign and deliver their shares to the Union National Bank of Houston.

Navarro was organized in 1922 as Farish-Watts-Collins company, and its name was changed to the present title in 1925. S. P. Farish is president of the company. Its producing properties are located principally in the Gulf Coast area and in East Texas, and comprise 65 leases on which 207 producing wells are located. In addition the company holds royalty interests on 22,336 acres and has a total of 55,725 acres of undeveloped leases in Texas, Louisiana, Illinois, Kansas, Arkansas, Mississippi, and Oklahoma. The current daily net production is approximately 6,000 bbl., of which approximately 1,160 bbl. is represented by royalty interest oil.

Cost Questionnaire to Be Mailed This Month

ST. LOUIS.—Most details of the crude-oil cost questionnaire which will be mailed this month to approximately 500 representative producers were thrashed out here last week at a meeting of representatives of the Office of Price Administration and members of the industry advisory subcommittee.

E. P. Potter, Amerada Petroleum Corp., Tulsa, heads the subcommittee appointed by the industry advisory group to work out the form and wording of the questionnaire.

The industry succeeded in gaining recognition for its most troublesome cost problem, subordination of historical data and inclusion of current replacement expenditures. There is no assurance that OPA will accept cost of reserve replacements in considering price ceilings. Final decision will rest with the Office of Economic Stabilization and the Office of War Mobilization.

Socony-Vacuum Barinas Wildcat Test Progressing

NEW YORK. — The Socony-Vacuum Oil Co., Inc., reports that its Venezuelan subsidiary is drilling at 3,556 ft. at a wildcat test in the Barinas district, central Venezuela.

In the San Joaquin district, the company is preparing to complete 5 Guario and 9 Guario is rigging up. In the Oficina area, 2 Guico is preparing to test at 7,018 ft.; 4 Guico is fishing at 6,951 ft. and 6 Guico has cemented casing at total depth of 6,930 ft.

In Colombia, Socony-Vacuum is reported coring at 4,819 ft. at 6 Contagallo, in the Magdalena River valley.

In the Sinu district, Sindicato de Inversiones, joint operation of Socony-Vacuum and Tropical Oil Co. is drilling and coring at 5,120 ft.

On the Barco concession, Colombian Petroleum Co. reports 14 Socuavo coring at 4,819 ft., while 15 Socuavo is fishing at 4,731 ft., and 16 Socuavo is ready to spud.

Salt Water Company Elects Officers and Directors

KILGORE. — Three changes were made in the directorate of East Texas Salt Water Disposal Co. at the annual meeting held recently in Dallas. George H. Card, production superintendent for Stanolind Oil & Gas Co. in its West Texas-New Mexico division, takes the place of J. H. Moyar, who recently retired from Stanolind. J. E. Bailey, assistant production superintendent for Tide Water Associated Oil Co. in the Gulf Coast area, succeeds George L. Nye, who recently resigned his position with that company. Larry O'Donnell, mechanical engineer, Shell Oil Co., Inc., replaces M. Albertson, who retired from Shell January 1. Officers of the company reelected: Bryan W. Payne, president; W. S. Morris, vice president and general manager; E. H. Blum, secretary-treasurer; R. R. Merrill, assistant secretary-treasurer.

New Assignments for Smith And Fowler Announced

WASHINGTON. — H. C. Fowler, formerly assistant chief of the petroleum and natural-gas division of U. S. Bureau of Mines, in Washington, has been transferred to Bartlesville, Okla., as supervising engineer of the bureau's petroleum experiment station there. N. A. C. Smith, for 19 years supervising engineer at the Bartlesville station, has been reassigned, at his own request, to the post of special assistant to the supervising engineer.

In his new position Smith will handle specialized research and technical writing. Dr. R. B. Sayers, director of the bureau, paid tribute to Smith's administration of the Bartlesville section, which has been expanded and developed to an important institution for petroleum research.

Smith, a graduate of Clark University, was engaged in industrial chemistry work for about 6 years before entering the petroleum and natural-gas division of the bureau in 1918. Fowler has been a member of the petroleum and natural-gas division 21 years. Graduated from Stanford University, he was employed by California oil companies for several years before joining the bureau in 1923.

THIS WEEK

PRICES—Refinery industry advisory committee appointed to study product manufacturing costs. . . . First meeting scheduled in Washington March 15. . . . Findings will be used to determine ability of refiners to absorb higher crude-oil ceilings. . . . May lead to subsidy for high-cost operations. . . . Complex and highly varied refinery-accounting methods certain to present confusing problems. . . . ¶Details settled on production-cost questionnaire, mailing to 500 producers scheduled this month. . . . ¶Agitation spreading for permanent price differential for stripper production. . . .

TRANSPORTATION—Permanent retention of most war emergency pipe lines expected by ICC analyst. . . . Load factor will determine ultimate disposition of big-inch lines. . . . ¶About 75 tank cars per month withdrawn from service, permanently deteriorated. . . . ¶Intensified Pacific warfare will create heavier call on tankers, serving longer supply lines and as floating storage. . . . Eastern storms extend reduction in rail movement of oil to seaboard. . . . ¶Little big-inch line handled average of 179,000 bbl. daily during first full year of operation, ended last week. . . . ¶Since 1939 640 American tankers have been put in service. . . .

PRODUCTION—Week-to-week rise in California output continuing. . . . Texas increase fails to offset reductions in Kansas, Illinois. . . . National output 23,500 bbl. below February quota for all petroleum liquids. . . . Added producing day in East Texas brings field's output up to 2,800,000 bbl. per week. . . .

SUPPLIES—Fuel oil critically short in eastern and northern consuming centers. . . . Large industrial consumers, with standby coal-burning facilities, asked to halt use of fuel oil. . . . ¶Inventories too low for relaxation of coupon values, despite record low temperatures at many eastern points. . . . Chicago area nearly as hard hit as East Coast. . . . ¶Navy releases 400,000 bbl. of fuel oil, accumulated for offshore movement, to relieve critical civilian conditions. . . . ¶Foreign Economic Administration reports shipments of 1,300,000 tons of petroleum products to Soviet Russia. . . .

RUBBER—Surplus of 1,300,000 tons annually expected within 3 or 4 years after liberation of East Indies and Malaya. . . . Domestic production of synthetic rubber exactly equals expected surplus. . . . ¶Experts hope to develop new uses to absorb part or all of extra tonnage, preserving synthetic industry. . . . New synthetic manufacturing facilities costing $37,000,000 approved for construction. . . .

OPERATIONS—Seven companies unitize Elk Basin (Wyoming) holdings, involving about 6,000 acres. . . . Ultimate percentage participation left flexible, pending full development. . . . Action emphasizes trend toward consolidated operations in postwar era, extending economies of unit production. . . . ¶Wildcat test started on block of 7 million acres of submerged uplands at, on and off southern tip of Florida. . . .

DRILLING—Completions lagging behind last October-November rate but at 35 per cent higher than last January. . . . Texas completions up nearly 60 per cent, Oklahoma gains 80 per cent for first 5 weeks. . . . ¶Eastern states, as unit, second to Texas in total completions, but are nearly 70 per cent ahead of last year. . . . ¶Notable declines are in Kansas, Indiana, Ohio, Kentucky and Southwest Texas. . . .

Acme Photo

New Yorkers lined up to buy 5-gal. lots of fuel oil, seeking temporary relief from acute shortage caused by extremely low temperatures and reduced deliveries by railroads and tank trucks. The 750-gal. tank truck was drained in less than an hour

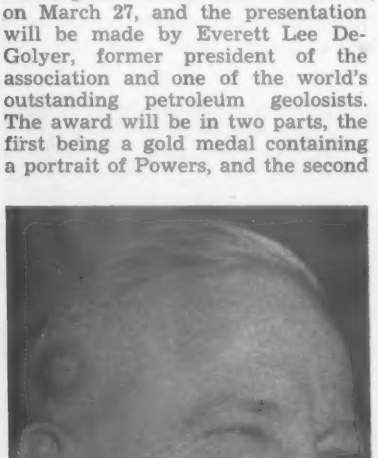
Pratt Selected as First Recipient Of Sidney Powers Award

CHICAGO.—Wallace Everette Pratt of New York City, internationally known petroleum geologist and a director of Standard Oil Co. (New Jersey) has been chosen as the first recipient of the Sidney Powers Memorial Award of the American Association of Petroleum Geologists. The announcement of the selection was made here this week by Ira H. Cram, Pure Oil Co., A.A.P.G. president.

This award, established in 1943, is the first and only award which recognizes eminence in the profession of petroleum geology. It is awarded "in recognition of distinguished and outstanding contributions to, and achievements in, petroleum geology." The selection committee, made up of 10 association members and 2 ex officio members, is headed by A. Rodger Denison, Amerada Petroleum Corp., Tulsa. The award is in memory of the late Sidney Powers, one of America's best known petroleum geologists and known throughout the profession as a "geologist's geologist."

The honor will be conferred upon Pratt during the annual business meeting of the association in Tulsa on March 27, and the presentation will be made by Everett Lee DeGolyer, former president of the association and one of the world's outstanding petroleum geolosists. The award will be in two parts, the first being a gold medal containing a portrait of Powers, and the second consisting of an engrossed diploma containing a citation which reads as follows:

"For his early and continued contribution to the art of exploration for oil through application of the science of geology and for his advancement of the profession of petroleum geology through his able and friendly skill as an administrator and an executive."



WALLACE E. PRATT

Life-Long Geologist

Pratt, a native of Phillipsburg, Kans., has been active in geology since 1908 when he served as an assistant on the Kansas Geological Survey. From 1909 to 1915, he was in the Philippines, first in the Bureau of Science and later as chief of the division of mines of the same bureau. In 1916 he returned to the United States and became a geologist with The Texas Co. in Houston. In 1918 he became chief geologist of Humble Oil & Refining Co., Houston, and in 1923 he was elected to the board of directors of Humble. In 1933 he became vice president of the same company. In 1937 he became a member of the executive committee of Standard Oil Co. of New Jersey, and from 1942 until recently he was a vice president of the Jersey company. He resigned from the vice presidency, but retained his directorship and membership on the executive committee.

Pratt, one of the preeminent finders and producers of petroleum, is also an author and lecturer of note. His numerous articles on various phases of petroleum geology and his book "Oil in the Earth" are outstanding contributions. He headed the A.A.P.G. as president a quarter of a century ago and is also a member of the American Institute of Mining and Metallurgical Engineers, the Society of Economic Geologists, and the Seismological Society of America, and a fellow in the Geological Society of America, American Geographical Society, and the American Association for the Advancement of Science.

A.I.C. Gold Medal Will Be Awarded John W. Thomas

NEW YORK.—One of the chemical world's highest honors, the Gold Medal of the American Institute of Chemists, last week was awarded to John W. Thomas, chairman of The Firestone Tire & Rubber Co. and directing head of its world-wide operations. The medal was given in recognition of the leadership of Thomas in rubber research, and for achievements under his direction in the development and production of synthetic rubber.

Announcement of the award, presented annually for "noteworthy and outstanding service to the science of chemistry or the profession of chemist in America," was made by Dr. Gustav Egloff, president of the institute and director of research for Universal Oil Products Co.

Former recipients of the medal include Dr. Willard H. Dow, president of the Dow Chemical Co.; Andrew W. Mellon, the late secretary of the Treasury, and his brother, the late Richard B. Mellon, of Pittsburgh; James Bryant Conant, president of Harvard University; and the late George Eastman, founder of Eastman Kodak Co.

Formal presentation of the medal will be made on May 11 at Columbus, Ohio, during the twenty-third annual meeting of the institute. The jury of chemists making the award was composed of Dr. Egloff; Dr. Harry L. Fisher, director of research for U. S. Industrial Chemicals, Inc.; Dr. Robert J. Moore, manager of the development laboratory, Bakelite Corp.; Dr. Maxmillian Toch, president of Toch Brothers, Inc., and chairman of Standard Varnish Works, and Howard S. Neiman, secretary of the institute.

Increased Ceiling Prices Granted Four Oil Pools

WASHINGTON.—Increases in crude-oil ceiling prices have been authorized in four pools by Office of Price Administration, effective January 1, as follows: Hillsdale, Okla., 35 cents a barrel; Getty, N. M., 14 cents; Grayson, Tex., 13 cents; Clabberhill, Tex., 12 cents.

At the same time an adjustment is made in the increase previously granted Emperor (deep) pool, Winkler County, Texas. Effective as of January 1, 1945, the increase is 25 cents a barrel. Previously it had been 20 cents. Investigation has shown that the pool qualifies for the 25-cent increase.

Also effective January 1, OPA has added 11 pools to the list of those qualifying for increases under the 9-bbl. provision of the stripper-well plan, as follows:

On October 31, 1944, OPA announced that the stripper-well plan would include cases where the average production costs for a pool are above the ceiling for that pool. A maximum increase of 35 cents a barrel can be granted under this extension.

New Pipe Lines to Continue in Oil Service in Postwar Era

by Henry D. Ralph

WASHINGTON.—Most of the new oil pipe lines, both crude and products, which have been built during the war will continue in use in the postwar period and will handle much of the petroleum traffic formerly carried by the railroads. Some of these lines probably will supplant tanker movements, it is concluded in a detailed study just completed for the Interstate Commerce Commission.

The 140-page study, "War-Built Pipe Lines and the Postwar Transportation of Petroleum", was prepared by Sam G. Spal of the Bureau of Transport Economics and Statistics but has not yet been considered or adopted by the commission. It contains a wealth of statistical material on wartime movements of petroleum within the eastern half of the United States and bases for estimating postwar costs of the various carriers and their probable disposition.

A few pipe lines, such as the Florida Emergency Line, are certain to be abandoned, it is concluded. The continued use of others, including the two big WEP lines, will depend on government policy, industry policy, load factors, competitive tanker rates, and other factors which cannot be entirely foreseen at the present. The converted and reversed lines in the East will be returned to their former status and use, while most of the new crude lines in the West will continue to be used about as at present.

Purpose of Study

The study was prepared primarily to forecast the postwar effects on rail traffic, and the conclusion is that the new lines, with lower costs than those of the railroads, will carry a considerable volume of traffic formerly moved by tank cars, particularly in the Southern and North Central states. Tank trucks operating from terminals on the new lines will supplement the pipe lines thereby further reducing the volume available for the railroads.

Much of the report is devoted to estimates of postwar operating costs of the two big-inch lines and of the new government-built tankers operating on the Gulf Coast-New York run. There are so many uncertain factors in these calculations that no firm conclusion is reached, but the indication is that unless the 24-in. line can be operated at close to its capacity it may not be able to compete with tanker rates, particularly if there is a surplus of tankers sold by the government at a generous depreciation rate. Prospects for future operation of the 20-in. products line in competition with probable tanker rates on gasoline are even less bright.

Most of the war-built pipe lines are treated in some detail from the standpoint of their probable postwar economy, the discussion including such factors as location with respect to centers of supply and areas of large consumption and costs of competitive carriers. The conclusion is that the Southeastern Plantation, and Portland pipe lines can permanently operate at lower costs than tanker and rail hauls.

Postwar Shipping Costs

Several possible ways of figuring postwar shipping costs between Texas and New York are given in the study, but the one favored by the author gives 16 cents per barrel as the cost of delivering crude via the big-inch" if operated at 300,000 bbl. per day; 17.1 cents at 250,000; 20 cents at 200,000, and 25.5 cents at 150,000 bbl. daily.

As against this the author concludes that the cost of shipping crude from Gulf ports to New York by the T-2 type of tanker will be 18.3 cents per barrel.

In summary, the report says:

"According to the estimates presented in this report, the postwar cost of transporting crude oil by the big-inch from East Texas and West Texas-New Mexico to the New York and Philadelphia refineries will be lower than the cost by the newest type of tanker. Also, there appears to be an adequate reserve of oil in these fields to feed the big-inch for many years. On the other hand, it is probable that there will be a surplus of tankers available after the war. The greater flexibility of tanker operations and the ability which they afford an oil company of conducting its shipping independently, without the joint action required in the use of the pipe line, predispose the companies to revert to tankers, if other considerations, particularly costs, permit. Certain oil companies on the East Coast appear ready to make this change when full-scale tanker operation again becomes possible. As the continued use of this pipe line in oil service will depend to a large extent upon how the major oil companies on the East Coast evaluate these and other considerations, no firm forecast of its future can be made at this time. The prices which the Government will ask for the pipe line and tankers may influence the decision of the companies to use the one facility, or the other, or both. If, however, the companies with the large refineries decide to use tankers exclusively, it is difficult to see how the big-inch could obtain a sufficient volume of business from other refineries to enable it to operate economically.

Large Construction Entailed

"A segment of the big-inch could be used to transport crude oil to the refineries in PAW District 2, chiefly in Illinois, Indiana, and Ohio. This proposal calls for large construction on the part of the oil companies to connect the line with their refineries. Even if these extensions are laid, it is questionable whether this segment of the line could obtain a sufficient volume of business for economical operation. The oil companies in this area may, however, be considerably influenced in deciding whether to use this segment by the price for which it may be offered.

"It is possible but not likely that new refineries will be built adjacent to the big-inch in PAW District 2 which will utilize a segment of the new line to near capacity.

"Government policy also will be an important factor in determining the disposition of this line and others. Under existing law, Defense Plant Corp. and Defense Supplies Corp. have authority to own and operate, respectively, the big-inch, little-inch, Southwest Emergency, Florida Emergency, Ohio Emergency, and the Richmond extension of the Plantation line until January 22, 1947. Unless this authority is extended, arrangements must be started at that time for the liquidation of the pipe lines and other properties of these corporations. The future of these agencies necessarily is tied up with the broader problem of the disposition of war plants and other facilities. It cannot be predicted at this time how rapidly or to what extent the Government will eliminate itself from manufacturing, transportation, and other business activities.

"The cost estimates previously given clearly imply that the little-inch pipe line will not be able to compete with the new tankers for refined oil traffic to the Atlantic seaboard. Here again, however, the disposition of the line will be influenced by the attitude of the oil industry and ultimately by govern-

ment policy. If the capital costs are reduced and the load factor is high, the pipe line may be able to operate to the East Coast in competition with tankers. If the line is to be used to supply interior destinations (PAW District 2) with refined oils, extensions will have to be laid to the large consuming areas in order to minimize the otherwise extensive trucking involved. Products of independent refiners which might use this line probably would encounter strong competition from the products of local refiners now serving this district."

Petroleum Industry Has Become Largest Producer of Chemicals

CHICAGO.—The petroleum industry has become during the war a larger volume manufacturer of synthetic organic chemicals than is the chemical industry itself.

So Chicago chemists learned last week from Dr. Robert E. Wilson, new chairman of the board of Standard Oil Co. (Indiana), at the "welcome home" dinner they joined in giving him.

When people talk about the petroleum industry getting into chemistry, they are behind the parade, he added. The petroleum industry's synthetic chemistry was in the prewar period a rather small tail on the chemical industry dog, but today it has become so large that it is beginning to wag the dog.

To illustrate, Dr. Wilson pointed out that two of the most important synthetic organic chemicals are phenol, which is used as the base of many plastics and for numerous other purposes, and aniline, known particularly for its use in dyes. Prewar production of the first was about 500 bbl. per day, and of the second about 300 bbl. per day. The chemical industry was also using toluene from coal tar, as a raw material for many other chemicals, at a rate of 1,550 bbl. per day. Today the production of synthetic toluene from petroleum is five times the prewar total production of all three, or more than 11,750 bbl. daily. The catalytic processes by which toluene is now produced from petroleum have been developed in only the last few years.

Butadiene, Dr. Wilson pointed out, is another vital synthetic chemical now coming from both the chemical industry and the petroleum industry. In the petroleum industry it is being synthesized at a rate of 8,000 bbl. a day, or 27 times the prewar production of the important chemical phenol.

"However, even these are minor-league figures," Dr. Wilson continued. "I believe the largest volume product of the synthetic organic chemical industries is ethyl alcohol, the wartime demand for which in connection with the production of synthetic rubber alone is about three times the total peacetime demand for all purposes. Total wartime demand is about 40,000 bbl. per day. Much more than half of this is made by fermentation of molasses and grains, rather than by what are ordinarily considered to be synthetic processes; but even this figure is dwarfed by the petroleum industry's current production of around 130,000 bbl. per day of alkylate made from two simple hydrocarbons by a reaction whose existence was not even suspected a dozen years ago.

"This synthetic mixture of closely related hydrocarbons is the most important constituent of 100-octane gasoline. As a matter of fact, well over 300,000 bbl. per day of 100-octane gasoline constituents are synthetic hydrocarbons if we include the new types of molecules which are produced by isomerization and catalytic cracking.

"In entering this field the industry not only went into catalytic operations on an unprecedented scale, but invented important new techniques which bid fair to revolutionize large-scale catalytic operations.

"A catalyst is usually defined as a substance which speeds up a reaction without being consumed therein, but there is always some unavoidable loss, and in the case of catalytic cracking the average daily consumption of catalyst is in the neighborhood of 200 tons. Consumption of catalyst on such a scale probably exceeds the total consumption of all the catalyst of the entire chemical industry."

Speakers at the dinner at which Dr. Wilson's return to Chicago was celebrated included R. R. Burtner, president, and E. H. Volwiler, Chicago Chemists Club; Roger Adams, chairman of the board of the American Chemical Society; Ward V. Evans, Chicago section, American Chemical Society; W. S. James, Society of Automotive Engineers; R. B. Harper, Chicago section, American Institute of Chemical Engineers; Gustav Egloff, Chicago section, American Institute of Chemists, and George I. Haight, Chicago Patent Bar association.

Just 10 years earlier the same group had given Wilson a hail and farewell dinner as he left Chicago to become vice chairman of Pan American Petroleum & Transport Co. His elevation to the position of chief executive of Standard of Indiana, speakers pointed out, puts a chemist at the head of that organization for the first time in its history, though there have been one to three chemists on the company's board since 1911.

Journal Editor Speaks Before NGAA Directors

DALLAS.—Arch L. Foster, refining editor of The Oil and Gas Journal, was the speaker before a dinner meeting of directors of the Natural Gasoline Association of America here, February 8. Foster discussed the postwar developments in refining, covering processes which will affect operations of the natural gasoline and allied industries, the technology of hydrocarbons, chemical syntheses from hydrocarbons, of the Fischer-Tropsch synthesis of hydrocarbons and its possible effect on the future of refining.

What Others Say:

PERMANENT SUBSIDY FAVORED

Owensboro, Ky.

Dear Sirs:

Charley Roeser has aptly said that stripper-well production cannot be maintained in competition with flush production and therefore, stripper production needs protection against price fluctuations.

This thing of subsidy has come to stay and we are going to have to be patient and cooperative with Government in working out a satisfactory system for payment. The issue is now confused because practical operators were not given sufficient consultation before the project was launched. Now it is discovered that subsidy payments cannot be based on pools; that a lot of unforeseen difficulties have arisen so that the situation is causing more and more concern.

The payment agency, DSC, seems to be at cross-purposes with OPA, the determining agency. There are some caustic opinions being expressed by some of the operators and purchasing agents, especially among the employes of the purchasing companies who have the endless job of answering specific questions out of Washington. There is a disposition to allow Government further opportunity to solve the vexing and growing problem. It's an opportunity for our several oil and gas associations to render a useful service. To date, it is surprising that the pages of our oil publications have apparently shied away from this business which ought to be frankly and fully covered.

The principle of subsidy is sound. The British have had it for many years in its merchant marine. We have it in our post office. If it is not successfully applied to our business of oil production within our continental borders, we shall be heading straight into government monopoly in petroleum as in Argentina.

THOMAS M. GALEY.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

The Fundamental Problem

COMPETENT observers who have made on-the-ground studies of recent developments in the Middle East and South America are in agreement that the fundamental problem of postwar petroleum, outside the United States, is not exploration, production or transportation, but marketing. Major reserves have been established in both hemispheres, particularly in the Middle East, with every reason to believe that the next decade will witness important additions.

The petroleum having been found, and its production and refining being merely a matter of installing the required operating and transportation facilities, the big question will be what to do with the finished products as they are made available. Thus international petroleum trade of the future largely revolves around what is done now to bring about an orderly and equitable distribution of the newer world oil supplies.

The existence of new reserves which can be developed in large volume is naturally a matter of concern to operators in the older areas, where production costs are substantially higher. Some have visioned a coming situation in which high tariffs and other defensive steps will be necessary in order to prevent a flood of foreign petroleum from bringing about a serious dislocation in domestic operations. These protective actions should be taken if there is no other solution.

A much sounder and a more workable program will be to expand the demands for petroleum in many countries, thus applying the method which through the years has quickly ended all oversupply threats in this country. A per capita petroleum consumption one-fourth that of ours over the rest of the world would treble prewar global demands.

First, it will be necessary that governments everywhere realize the part that petroleum should play in their postwar growth. Their attitudes in the past are apparent from their taxing practices. In 1939 the retail price for gasoline per gallon in Paris was 29 cents; Berlin, 59 cents; Rome, 73 cents; London, 35 cents; Delhi, 43 cents.

Automotive gasolines were being delivered to the shores of the countries in which these cities are located at prices ranging from 7 to 10 cents per gallon. The differences between the terminal quotations and the retail prices were accounted for by exorbitant taxes and duties. These policies emanated from a wholly erroneous belief that automobiles and their fuels are luxury products and should be taxed as such.

There can be no large expansion in the foreign use of petroleum products so long as revenue to the governments represents 75 to 90 per cent of the retail prices. Had comparable taxes been effective over the past quarter-century in this country, there would have been no petroleum and automobile industries as we now know them, and our unparalleled growth in all business activities, the impetus for which came from petroleum power, would not have materialized.

It is true that no peace plan nor any program of international collaboration goes so far as to dictate or suggest the internal taxing policies of nations. But governmental leaders can be made to understand the direct relationship that exists between the economic development of their countries and adequate supplies of low-priced petroleum. Standards of living around which national stability and world security will evolve constitute the basic issue at stake.

Response of Limestone Pool to Flooding Reported by Bureau

WASHINGTON. — An 87,000 - bbl. increase in oil production in 20 months was reported for 41 oil wells embraced in the first systematic water-flooding project ever tried in an Illinois oil-producing limestone formation, according to an engineering survey released last week by the Bureau of Mines.

Although tried previously with success in sandstone formations in that state, the water-flooding project covered in the bureau's survey marked the first attempt at flooding an Illinois limestone formation and is one of the few of the nation in a limestone reservoir, Dr. R. R. Sayers, director of the bureau, reported.

Describing the project on a 13,000-acre tract in the McClosky limestone of the Clay City field, the report shows that the 87,000-bbl. increase in production was obtained by injecting 1,900,000 bbl. of river water into three old wells along the edge of the field. Much of the oil might not have been produced by continued use of primary oil recovery methods, bureau officials said.

Since secondary-recovery projects in limestone reservoirs are not numerous and involve problems not usually encountered in sandstone formations, the information by the bureau will furnish additional technical guidance for other producers.

The report includes a discussion of the development, production, and reservoir conditions in the Clay City field and also shows the estimated oil gained from each of the wells affected by water injection. In addition, details are given on the elapsed time between the start of water injection and the first noticeable increase in the rate of production, and a comparison is made of the oil-producing histories of the wells first affected and those not affected until later.

Other statistics compare the subsurface well data and primary production histories to show their relationship to the amount of oil gained from each well by water-flooding and to determine the spread of the injected water through the surrounding limestone areas as computed from analyses of water produced by wells adjacent to the injection wells.

A copy of the survey, Report of Investigations 3792, may be obtained by writing the Bureau of Mines, Department of the Interior, Washington.

Large Eastern Users Asked to Save Oil, Use Coal

WASHINGTON.—Moving to avert a critical shortage of industrial fuel oil on the East Coast, the Petroleum Administration for War last week called upon 87 large-scale consumers to use standby facilities that already have substitute fuel on hand.

The action became necessary, Administrator Ickes said, to compensate for the reduction in East Coast deliveries, which fell off during the last 2 weeks when severe weather conditions disrupted overland transportation.

Deputy Petroleum Administrator Ralph K. Davies said that the 87 consumers (15 utility companies and 72 other large industrial plants) were requested to begin using their coal-burning facilities because a survey conducted by PAW last week showed that all of these consumers had as much as 30 days' supply of coal in their yards stocked for emergency use.

"We cannot afford to take any chances with our residual-fuel-oil inventories," Davies said. "The East Coast had 5,503,000 bbl. of residual fuel oil in stock on January 20. This was 272,000 bbl. less than we had at the same time last year.

"With the transportation system as critical as it is, we must take every means possible to protect our supplies so that the operations of war plants and large buildings will not be hampered for lack of adequate fuel."

Davies estimated that the 87 fuel oil consumers who will now use their standby facilities regularly will save an aggregate of 30,000 bbl. of residual oil a day, or 900,000 bbl. in the next 30 days.

Tanker H. D. Collier Sunk With Loss of 33 Lives

WASHINGTON.—Attacked by unseen submarine, the Standard Oil Co. of California's tanker H. D. Collier was sunk in the Arabian Sea, with the loss of 33 merchant seamen, War Shipping Administration reported this week. The vessel was carrying 102,000 bbl. of high-octane gasoline.

After three torpedoes struck, the raider surfaced and shelled the tanker as two lifeboats were launched. One, containing the vessel's master, Capt. Joseph Fox, Oakland, Calif., was swamped and it drifted into flames fed by gasoline which covered the water surrounding the ship, and all aboard were lost.

A second lifeboat in which seven seamen and seven Navy gunners escaped, circled the sinking steamer all night in an effort to pick up other survivors. She was bracketed by shells from the submarine and none was found. The submarine eventually left the scene and after several days in the lifeboat the 14 survivors were rescued by the SS Empire Raja.

For "exceptional performance of duty under emergency conditions," James E. O'Brien of Oakland, chief mate, received commendation from Vice Admiral R. R. Waesche, commandant of the U.S. Coast Guard.

The H. D. Collier, 12,700 deadweight tons, was built in the Chester, Pa., yard of the Sun Shipbuilding & Dry Dock Co., in 1938.

Four Companies to Increase Synthetic-Rubber Output

WASHINGTON. — Production of synthetic rubber is to be increased through expenditure of some $37,000,000 in construction of new facilities and acquisition of existing plants, Defense Plant Corp. announces. Four rubber companies figure in the expansion program. The following construction and purchases have been authorized, title of all properties to remain with DPC:

1. Plant to be built at Tuscaloosa, Ala., at a cost of $18,000,000, for operation by B. F. Goodrich Co.

2. Equipment for construction of plant facilities at Nashville to cost $10,000,000, and machinery and equipment for an Akron plant at cost of $500,000, by Goodyear Tire & Rubber Co.

3. Machinery and equipment costing $7,000,000 for a Pottstown, Pa., plant, $250,000 for a Memphis plant, and $1,000,000 for equipment at an Akron plant for Firestone Tire & Rubber Co.

4. Machinery and equipment at a cost of $400,000 for a Dayton plant for Dayton Rubber Manufacturing Co.

Glacier's Montana Holdings Acquired by Union Oil

LOS ANGELES.—Union Oil Co. of California has acquired the producing and refining properties of Glacier Production Co. in Montana for a reported consideration of $9,900,000. Most of the holdings are in the Cut Bank field. Glacier was a subsidiary of Montana Power Co., which had been ordered to divest itself of the oil-producing properties.

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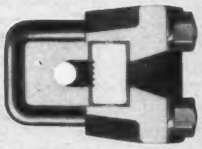

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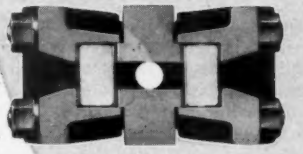

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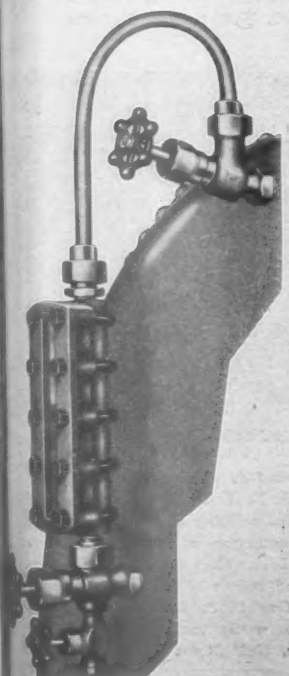

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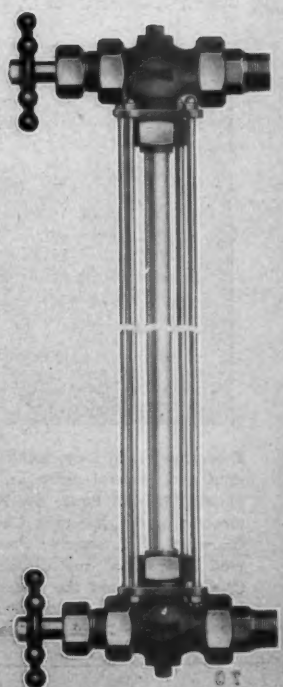


PENBERTHY INJECTOR CO.

DETROIT, MICHIGAN • Canadian Plant: Windsor, Ontario

PENBERTHY PRODUCTS

Petroliferous Provinces in Alaska Justify Additional Exploration

WHILE there is no commercial production at present, the information on the petroliferous provinces of Alaska justifies further exploration with the possibility that this northern area will add substantially to the proven petroleum reserves of this country, Dr. Philip S. Smith, chief Alaskan geologist of the U. S. Geological Survey, told the members of the Tulsa Geological Society, February 5. The Tulsa address was one of 19 being made by Dr. Smith to geological societies on the "Potential Petroleum Resources of Alaska." His talks are based on many years of field studies in Alaska.

Climatic and terrain conditions do not present impossible operating conditions, Dr. Smith explained, in outlining the field work of the geological survey, including that in the most northern parts of Alaska. The field parties operated from tents in periods of low temperature as well as during the summer months when temperatures in the middle section of Alaska are as high as 80° to 100° F.

In the northern area near Point Barrow, where the Navy now has an expedition with test drilling equipment, the presence of seeps was first reported in 1909. Oil from these seeps along the Arctic Coast is used by the natives. The bedrock in this area is presumably Cretaceous. This general area is all part of the Naval Petroleum Reserve. In the inland area of this northern province there are also seepages and beds of rich oil shale have been identified. The Navy plans to drill favorable structures near these seepages.

In the Katalla district of the Alaskan Gulf area there was small commercial production from shallow wells up to 1933. The oil was paraffin base. The deepest test was about 2,200 ft. Dr. Smith explained that the geologic formations were dominantly marine Oligocene of complex structure with thrust and normal faulting. In the Yaktaga district of the same area drilling has been carried on to depths of 2,000 ft. The formations are marine Tertiary with numerous folds, the principal ones trend east-west with steep dips. Beds aggregating 12,000 ft. have been identified.

In the Iniskin-Chinitna district of the Alaskan Peninsula, shallow tests were drilled in 1902-1906 and a deep test to 8,800 ft. in 1936-1939. No commercial production was reported but samples of paraffin-base oil were recovered. The exposed formations include Naknek and Chinitna shales and sandstones of upper Jurassic age and Tuxedni sandstone of Middle Jurassic. The main anticline is about 12 miles long northeast-southwest. The sedimentary section embraces more than 14,000 ft. of beds.

In the vicinity of Kanatak of this general area gas showings are reported at Cold Bay. Drilling took place at Oil Creek with no production. The Bear Creek-Salmon Creek structure which is 5 miles inland from Jute Bay was tested to a depth of 7,500 ft. with numerous showings of oil and gas. It was stated that 6,000 ft. of this test was in Kialagvik formation of the Lower Jurassic age. Dr. Smith also reported on the Wide Bay district of this area and several miscellaneous areas where seepages exist.

New Chemical Company Officials Honored

PORT ARTHUR.—Officers of the newly organized Jefferson Chemical Co., formation of which was reported recently in The Oil and Gas Journal, are shown at a dinner here recently. Executives of The Texas Co., city officials and civic leaders joined in honoring officers of the chemical company.

Jefferson Chemical Co. has been formed to develop and manufacture chemicals from petroleum hydrocarbons, and is owned jointly by The Texas Co. and American Cyanamid Co.

The plants to be operated by this company will be built adjacent to the various Texas Co. refineries.

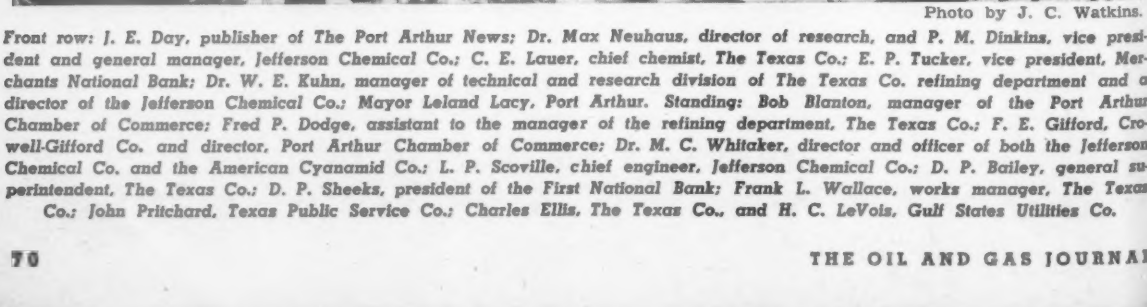


Photo by J. C. Watkins.

Front row: J. E. Day, publisher of The Port Arthur News; Dr. Max Neuhaus, director of research, and P. M. Dinkins, vice president and general manager, Jefferson Chemical Co.; C. E. Lauer, chief chemist, The Texas Co.; E. P. Tucker, vice president, Merchants National Bank; Dr. W. E. Kuhn, manager of technical and research division of The Texas Co. refining department and a director of the Jefferson Chemical Co.; Mayor Leland Lacy, Port Arthur. Standing: Bob Blanton, manager of the Port Arthur Chamber of Commerce; Fred P. Dodge, assistant to the manager of the refining department, The Texas Co.; F. E. Gifford, Crowell-Gifford Co. and director, Port Arthur Chamber of Commerce; Dr. M. C. Whitaker, director and officer of both the Jefferson Chemical Co. and the American Cyanamid Co.; L. P. Scoville, chief engineer, Jefferson Chemical Co.; D. P. Bailey, general superintendent, The Texas Co.; D. P. Sheeks, president of the First National Bank; Frank L. Wallace, works manager, The Texas Co.; John Pritchard, Texas Public Service Co.; Charles Ellis, The Texas Co., and H. C. LeVois, Gulf States Utilities Co.

Learning the extent of America's industrial war production, French journalists who are visiting the United States recently called at the Sun Oil Co.'s refinery at Marcus Hook, Pa. They were accompanied by representatives of the Office of War Information, the Sun Oil Co. and the Houdry Process Corp. Shown here in the control room of Sun's new 20,000 bbl. high-octane TCC unit are: Arthur E. Pew, Jr., Sun Oil Co., vice president in charge of manufacturing; Stephane Pizella, of the Parisien Libere Liberation Soir (Paris); Robert Wichner, of the Lyons-Libre (Lyons); Marcel Colin, of OWI; Arthur V. Danner, executive vice president, Houdry Process Corp.; Madame Andree Viollis, of Ce Soir-Humanite (Paris); Francois Pieur; Louis Lombard, of Les Allobroges (Grenoble); Pierre Denoyer, of the France Soir (Paris); Pierre Quilleret, treasurer, Houdry Process Corp., and James Sachs of OWI

A.P.I. Cancels All But One District Conference

DALLAS. — The regular spring meetings of the various districts in the Division of Production, American Petroleum Institute, have been canceled for 1945, with the exception of the Pacific Coast district, it has been announced by D. T. Ring, chairman of the central committee on district activities.

The meeting of the Pacific Coast district will be held in the Biltmore Hotel, Los Angeles, March 29—a 1-day meeting. Meetings of the Pacific Coast district are always held in Los Angeles. The March 29 meeting will not present any unusual travel or hotel difficulties, because the majority of those attending reside in the Los Angeles area.

DEATHS

Burton S. Taylor, 65, oil producer of Bradford, Pa., died February 2. Before entering the oil business, Taylor for many years was an educator, receiving his training at Lock Haven Normal School and for 8 years serving as superintendent of McKean County schools.

Bruce A. Reynolds, 60, independent oil operator, died February 4 in Wichita, Kans.

Alexander Duckham, 67, who made a fortune of oil and spent large sums helping children of men who lost their lives in aviation service, died recently in London. He was chairman and managing director of Alexander Duckham & Co., Ltd., oil producers.

Ben D. Koontz, 60, assistant secretary of Shell Oil Co., Inc., in charge of the company's Los Angeles legal department, died of a heart attack January 27. Koontz was admitted to the West Virginia bar in 1905; served as judge of the criminal court of Fayette County, that state, and practiced law in Fayetteville, W. Va., till 1920, when he joined Union Oil Co. of Delaware as attorney. Union was taken over by Shell 2 years later.

Earl J. Goldman, 56, retired administrative assistant in the production department of Stanolind Oil & Gas Co., died January 21 in Tulsa.

E. B. Oliver, retired oil operator, died January 31 in Longview, Tex. Besides his oil holdings Oliver had banking and mercantile interests.

M. R. Terrell, 55, who operated in the East Texas oil field, died of a heart attack last week in Overton, Tex., shortly after receiving a telegram notifying him that his son, Chester Terrell, had been wounded in action in Belgium.

Norman M. Smith, 47, for 25 years production superintendent for the T. Karl Simmons oil interests, died of a heart attack January 31 in Tulsa. He was a graduate of University of Arkansas and served in the Navy in World War 1.

Eshelby F. Lunken, president of Lunkenheimer Co., died January 26 of a heart attack suffered while clearing snow from in front of his home in Cincinnati. He was to have been a guest of honor that evening at a dinner celebrating the golden anniversary of National Association of Manufacturers, of which his company was one of the founders.

I. W. Buzza, 87, for many years an oil operator in the Gulf Coast area, died January 28 in San Antonio.

C. T. Daye, 48, oil operator of Henderson, Tex., met death January 30, when his automobile crashed against a stop-light pole in that town.

Newton S. Wilson, formerly of Denver, who represented the late Verner Z. Reed in the opening of the Salt Creek field in Wyoming, died in Los Angeles January 27 at the age of 81. Later he was superintendent of production for the Midwest Refining Co. and then president of the Western States Oil & Land Co., an exploration subsidiary.

Leo Joseph Byrnes, of the California Texas Oil Co., Ltd., died at St. Francis Hotel in San Francisco January 26. He entered the service of The Texas Co.'s refinery at Port Arthur, Tex., in March 1927 as an engineer. During his association with The Texas Co. he held a number of responsible positions in the refining department at Port Arthur and later in New York. In September 1937 he became associated with the California Texas Oil Co., where he was closely associated with all branches of the oil industry, including refinery operations in the Persian Gulf.

John M. Hannay, 72, retired executive of Union Oil Co. of California, died January 23 in La Jolla, Calif. He had resided in California 50 years and was a former president of Los Angeles Tennis Club.

Herbert L. Pratt, 73, retired chairman of Socony-Vacuum Oil Co., Inc., died February 3. A former president of the old Standard Oil Co. of New York and chairman of its board, Pratt became head of Socony-Vacuum when it was formed through a merger in 1931. He retired in 1935. He was educated at Amherst College and later served as a trustee of Amherst, Pratt Institute, and Metropolitan Museum of Art.

Maj. Daniel F. Elam, 28, engineer, Duncan, Okla., formerly employed by International Geophysics, Inc., and Halliburton Oil Well Cementing Co., lost his life in action September 17, 1944, over Holland in the initial attack against the Siegfried line. He was liaison officer of a troop-carrier group which flew paratroopers into the attack.

Mammoth Gas-Repressuring Project To Start in West Pampa Pool

by Kenneth B. Barnes

A SIGNIFICANT addition to the areas where modern recovery methods are applied to increase oil production and ultimate yields will soon start in the large West Pampa pool, Gray County, Texas. Here the owners of almost 100 per cent of the producing acreage have joined together to form the West Pampa Repressuring Association.

The project is particularly outstanding not only in the large number of operators, wells, production, and reserves that are involved, but also in the efficiency, speed, and thoroughness with which the preliminary investigative and contractural problems were handled for so large an undertaking.

In forming the West Pampa Repressuring Association, first engineering studies were started in May 1943, and a detailed engineering prospectus report was submitted to all the operators in the pool at a meeting the following month. A second operators' meeting was held in October 1943, when additional production data and repressuring information were discussed. At the latest meeting, held in July 1944, final suggestions and revisions in the plan were brought forth, and on September 18, 1944, articles embracing the formation of the unincorporated, nonprofit association, dedicated to the cooperative effort of installing and maintaining gas repressuring in the dolomite formation in the West Pampa area, were submitted to the 49 different owners of the various oil-producing properties.

The last signature to the agreement was made on January 13, 1945, and the first organizational meeting on a permanent basis will be held for the new association on February 15, when steps for immediate commencement of operations will be taken up.

Work May Lead to Large Extensions

Engineers who have worked in the development of the West Pampa project feel that the program, when well under way, as a secondary-recovery operation will rank well up with the largest in the country, such as the gas repressuring in the Burbank fields of northern Oklahoma and at KMA in North Texas. They point out that the West Pampa operation ultimately may be, on an intensified basis, the largest of all such recovery applications.

The West Pampa field, which is centrally located in a long trend of individual pools making up the Texas Panhandle oil-producing area, is shown in Fig. 1. Should the program develop successfully, as there are good reasons to believe from the information available, the work undoubtedly will spread to the other Panhandle pools in the large area.

In total, the Panhandle oil pools shown in Fig. 1 comprise 153,058 productive acres on which are located 5,844 producing oil wells and for which current allowable is about 88,750 bbl. per day. Cumulative production to January 1, 1945, is slightly more than 503,000,000 bbl., and the present reserves obtainable by primary means are placed at 520,000,000 bbl.

There already are two small but successful gas-repressuring operations being conducted elsewhere in the Panhandle area. It is reported

NATURE OF WEST PAMPA PROJECT

PURPOSE — Establishment of gas repressuring in the pool for recovery of crude oil.

TYPE—Cooperative, each present lessor to retain individual ownership and operation of properties.

INPUT GAS—Available residue of participants to be gathered from 5 gasoline plants in pool, compressed at 1 to 2 booster plants (to be built), and delivered to individual operators for injection.

COST OF FACILITIES NEEDED — Field-wide high-pressure gas injection system, hydrogen-sulfide treaters, dehydrators, to be underwritten by oil operators.

COST OF GAS COMPRESSION—To be paid by each oil operator on pro rata basis of his monthly oil production to total from entire project.

COOPERATIVE AGREEMENT — Carries signatures of 49 owners; there are 26 active operators (12 major companies, 14 independents).

Fig. 1—Map of Texas Panhandle producing area. Oil pools are stippled areas; the sweet and sour gas producing territories are indicated. (Courtesy E. C. Jacobson maps)

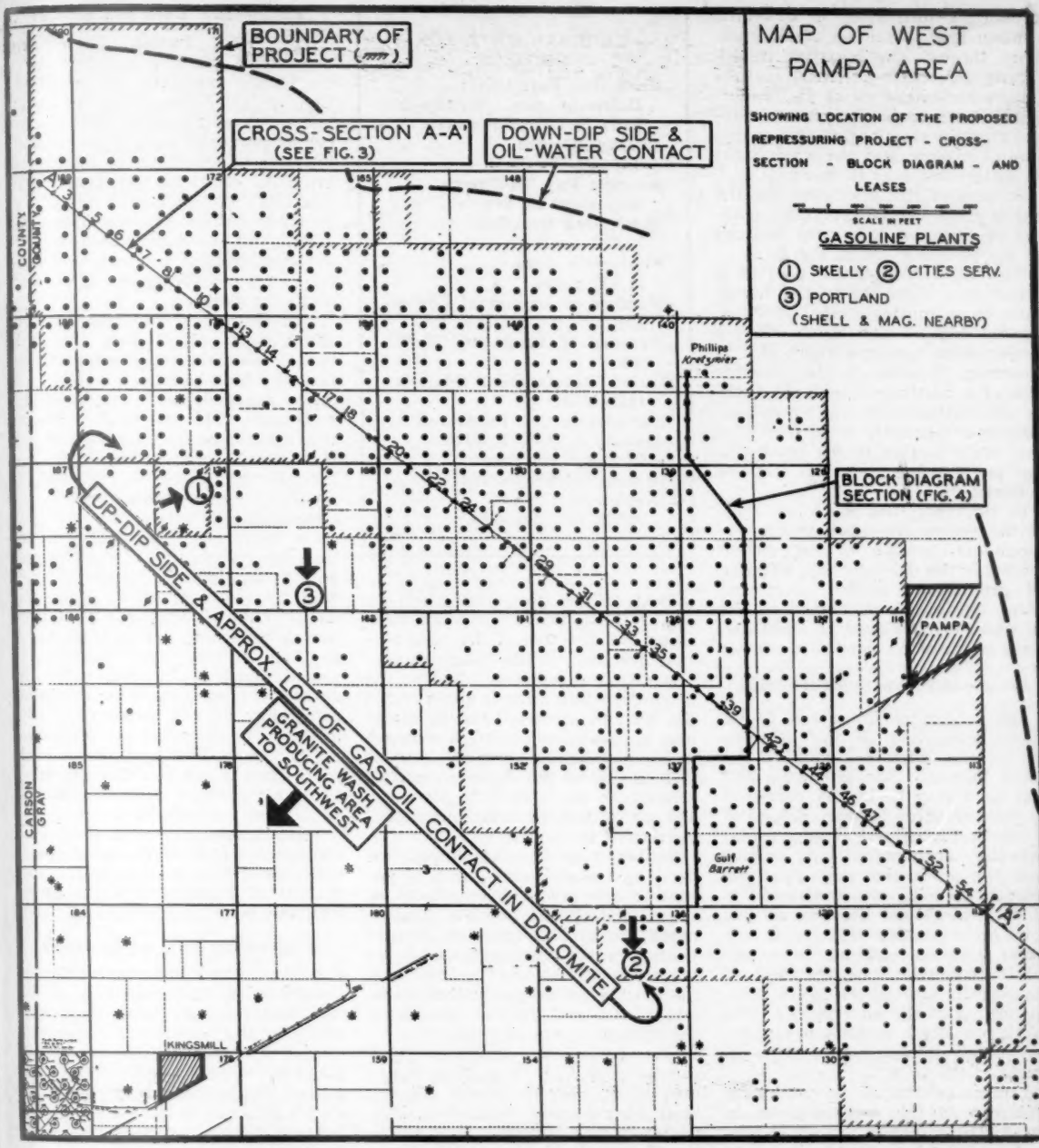


Fig. 2—Field map showing important features of project; included are locations of stratigraphic cross section shown in Fig. 3 and isometric block diagram given in Fig. 4

that at this time preliminary secondary-recovery examinations are being made of one of the other large individual pools, and it may be that developments similar to the West Pampa project may get under way in the near future.

West Pampa Committee Studies

Development plans for the West Pampa project, involving a total of 14,320 acres (11,500 productive), 101 individual leases, and 950 producing wells, necessarily a voluminous and complex engineering subject for gas-repressuring application, were greatly facilitated and simplified by the formation of preliminary geological, engineering, and legal fact-finding and study committees. Work of these study committees was coordinated by a temporary executive committee which subsequently aided in issuing the final technical reports to the different West Pampa operators for consideration.

Nature of the final plan, which will be discussed later in some detail, is unique in the simplicity with which the cooperative repressuring details are handled as among operators, even though a mass of many different factors had to be incorporated.

Geology of Repressure Area

The geological committee commenced its studies by gathering pertinent structural, thickness, pay character, and saturation data for a large majority of the producing wells in the pool. From these basic data a number of two and three-dimensional exhibits were constructed to display the important features of the reservoir. The exhibits included a typical columnar section showing the zoning of the

producing formation, a structural contour map, a number of cross sections through the reservoir in different directions to illustrate the nature and character of the producing zones, and isopachous maps showing the distribution of free gas, the oil reserve, and the water table at different places in the pool. .

A map of the area covering the entire project and displaying a number of the most important features of the pool is given in Fig. 2.

The structure of the pool is a broad nose plunging to the northeast. In a southwesterly direction, shortly beyond the limits of the project area, occurs a sharp rise in structure, or possibly the upthrow side of a northwest-southeast fault. In this southwestern region the dolomite pay is entirely filled with free gas, while further to the southwest the pay pinches out and becomes nonexistent.

In summary, the southwest edge of the repressure block is the approximate location of the gas-oil contact of the dolomite pay, with the oil-productive section occurring down dip across the block to the oil-water contact found a short distance beyond the northeast edge.

GENERAL DATA FOR PROJECT

Producing Formation:
Dolomite pay, Wichita-Albany of Lower Permian.
Average Depth:
3,000 ft.
Average Pay Thickness:
About 100 ft. over-all.
Total Area Included:
14,320 acres.
Productive Area:
11,500 acres.
Number of Individual Leases:
101.
Number of Producing Wells:
950.
Initial Development (Major):
1927-1928.
Cumulative Oil Recovered to January 1, 1944 (Approx.):
5,500 bbl. per acre.
Present Oil Production (Approx.):
14,500 bbl. per day.

Nature of Productive Formation

The producing formation, as already mentioned, is the dolomite pay of the Wichita-Albany in the lower Permian. The producing section itself may be briefly described as follows: The "brown dolomite" is the first massive brown granular dolomite encountered in drilling near the productive pay. First developed porosity occurs after 30 to 40 ft. penetration. Starting at this point are a number of granular dolomite sections and an important oolitic zone which carries most of the porosity and makes up the largest portion of the oil reservoir. The oolitic porosity is variable in amount and total thickness at different places in the area.

A cross section of the producing formation in the pool is given in Fig. 3. The direction is from northwest (point A) to southeast (point A') and the exact location is displayed on the pool map given by Fig. 2. Data on 58 different wells along the direction of the cross section are used in the illustration.

A different pictorialization of the productive formation is given across the pool in a south-to-north direction by the isometric block diagram in Fig. 4. This presents the location and nature of the different porous zones both in relation to structure and with reference to the initial production of the wells.

It should be mentioned that underlying the dolomite pay is a porous granite wash series (Cisco) of the Upper Pennsylvanian. Underneath the project area the granite wash is water bearing; however, to the southwest beyond the limits of the block some oil production is obtained and still further southwest the formation contains gas.

The geological committee was composed of A. B. Van Tine, chairman (Gulf); W. D. Maxey (Stanolind); C. Ferguson (Magnolia); Bob Cisney (Cities Service); J. A. Quigley (Texas); L. K. Knight (Phillips); and L. M. Oles (Sinclair Prairie).

Engineering Data and Studies

The West Pampa Engineering Committee gathered together all of the factors necessary for consideration of gas-repressuring operation and prepared estimates of the number of gas input wells to be needed, injection volumes, size of field lines, probable effect on oil production, amounts of increased recovery, probable future increase in gas-oil ratios, and the many other attendant computations and estimates necessary for comprehensive evaluation of the proposition.

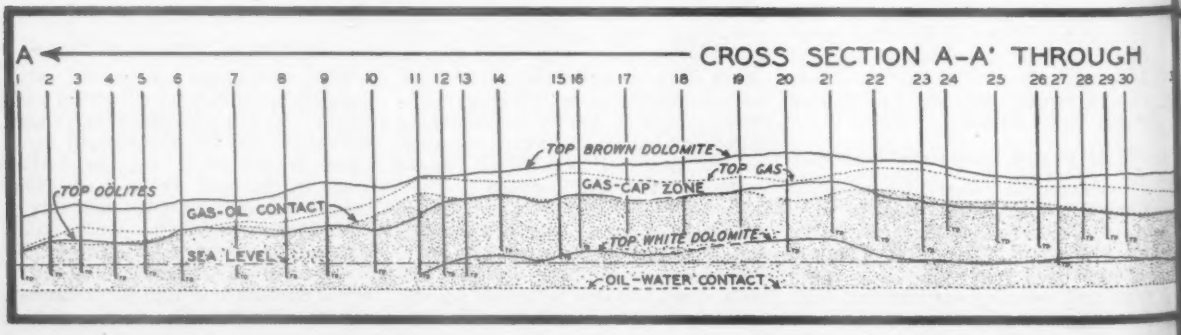
One feature of the final reports which were submitted to the individual operators was the number of factors which had been worked out on a representative or "average" well basis. This mode of presentation made it possible for each owner to study the proposal as it affected him. For any owner to estimate his input-gas requirements, possible increased oil-production rate and ultimate recovery, future gas production, repressuring costs, etc., he had only to multiply the "average" well data by his number of producing wells. While it was true that producing conditions varied from place to place in area, since the project was designed to be cooperative in nature with each operator retaining ownership of his properties, this manner of presenting the engineering factors made it possible for each participant to consider the operation as to his part on proportional but still rather accurate basis.

The engineering committee was composed of L. L. McWilliams, chairman (Phillips); F. D. Baker (Kewanee); N. E. Maxwell (Cities Service), and W. H. Burke (Shell).

Engineering Data on Reservoir

A few of the important features developed by the engineers were: The reservoir has been producing solely by the release and expansion of gas dissolved in the crude oil. Major development occurred in 1927-28 and the original reservoir pressure is believed to have been on the order of 450 p.s.i. at the datum +150 ft. Original gas in solution was only some 210 cu. ft. per bbl. Shrinkage

Fig. 3—Stratigraphic cross section of profile A-A' through West Pampa area. Oil reservoir is indicated by stippled area. Both


A
CROSS SECTION A-A' THROUGH
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
TOP BROWN DOLOMITE
TOP GAS
GAS-CAP ZONE
TOP OOLITES
GAS-OIL CONTACT
TOP WHITE DOLOMITE
SEA LEVEL
OIL-WATER CONTACT

of the reservoir crude from original pressure to atmosphere was found to be about 13 per cent. Interstitial water content was estimated to average 20 per cent. Total initial oil in place within the zones containing porosity was estimated to average between 40,000 and 50,000 bbl. per acre.

For the data, using a number of different methods, it was concluded that the average recovery by natural producing methods would approximate 10,000 bbl. per acre. From the investigations it was estimated that the total increase in oil recovery by the application of the gas-repressuring plan might be a minimum of 17,250,000 bbl. and the maximum expectancy could be 40,250,000 bbl.

Present Status of Production

It was developed that the average West Pampa well currently has a probable sustained producing capacity of no more than 20 to 25 bbl. per day, and, without repressuring, within the next 1 to 2 years the majority would not be able to produce the present allowed rate.

As a matter of fact, when the studies started the pool allowable had been about 18,500 bbl. per day, with some 21 operating days per month. When permissible operating days were gradually increased to 28 or more per month the near-to-capacity nature of the production was emphasized. A definite and substantial actual production decline lately has been in progress, with production now averaging about 14,500 bbl. per day. The details brought to light the fact that without repressuring some of the wells which now are very small, shortly would be noneconomic and ready for abandonment.

With gas repressuring the average well, it was estimated, might continue the present allowable for 3 to 4 years longer than under primary operations, and therefore continue at substantially higher rates, although the total future producing life would remain about the same, 21 years.

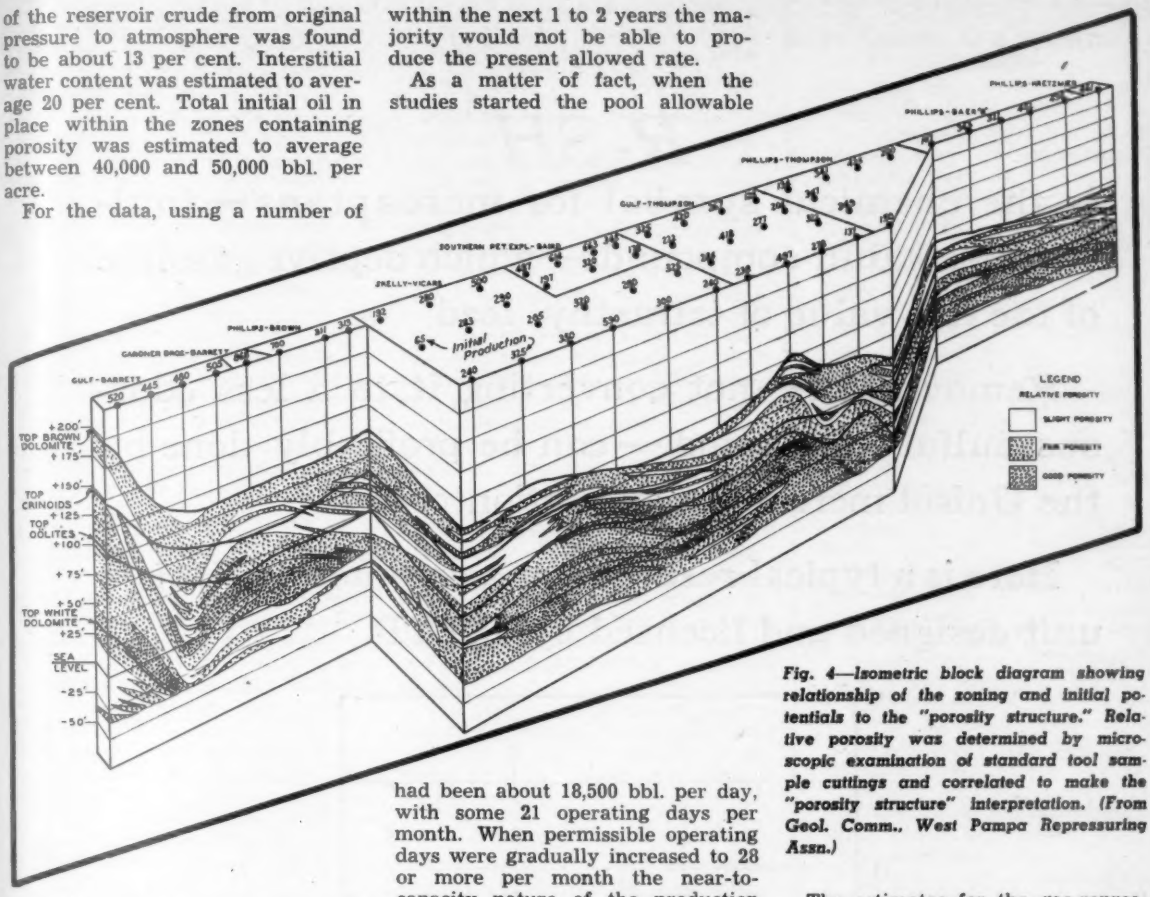


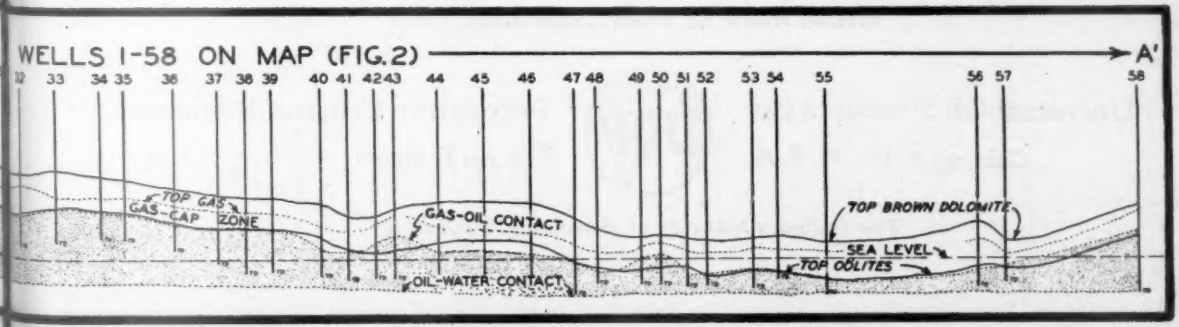
Fig. 4—Isometric block diagram showing relationship of the zoning and initial potentials to the "porosity structure." Relative porosity was determined by microscopic examination of standard tool sample cuttings and correlated to make the "porosity structure" interpretation. (From Geol. Comm., West Pampa Repressuring Assn.)

The estimates for the gas-repressuring plan were developed in the form of curves for future increased oil production, gas production, gas-oil-ratio trend, injected gas needed (both available residue and later, "makeup"). Detailed designs for a field-wide, high-pressure, gas-repressuring system were calculated.

Features of Repressure Plan

It is planned to convert one well per 160 acres to input service and inject about 100 M.c.f. per day per input well. At the start, approximately 70 input wells are contemplated, using a total daily injection rate of approximately 7,000,000 cu. ft. It is expected that further ex-

directions are to scale but vertical is 10 times larger than horizontal. (From Geol. Comm., West Pampa Repressuring Assn.)

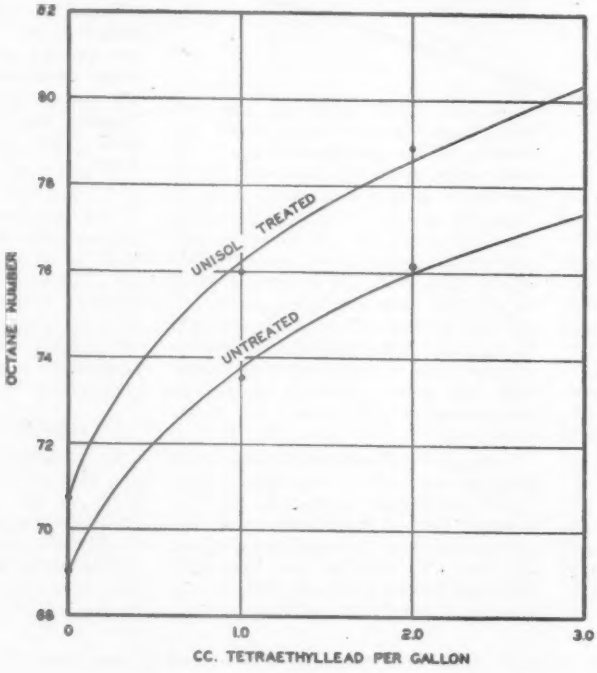

WELLS 1-58 ON MAP (FIG. 2)
A'
32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58
TOP GAS
GAS CAP ZONE
GAS-OIL CONTACT
TOP BROWN DOLOMITE
SEA LEVEL
TOP OOLITES
OIL-WATER CONTACT

R-SH

is the chemical symbol for mercaptans — foul-smelling sulfur compounds—which deprive gasoline of the full value of tetraethyl lead

Removing it — not converting it to a less odorous sulfur compound — can be profitably done by the Unisol mercaptan extraction process

Here is a typical result from a commercial Unisol unit designed and licensed by U. O. P.



GASOLINE POWERS THE ATTACK — DON'T WASTE A DROP

Universal Oil Products Co.
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The Refiners Institute of Petroleum Technology

pansion will be dictated by experience but the ultimate number may be on the order of 145 to 230 input wells and the total daily injection rate about 30,000,000 cu. ft.

To determine input characteristics for the field, a number of gas-injection tests were made with portable compression equipment. It was found that for the 100-M.c.f.-per-day rate, injection pressures ranged from 155 to 415 p.s.i., being lower in the southern section and higher in the northern. Present bottom-hole pressure is approximately 300 p.s.i. and the low permeable capacity of the formation is indicated by the wells requiring 100 to 125 hours to build up to equilibrium static condition.

It was found most desirable to have this done as an adjunct service to existing gasoline plants in field.

Design of the field-wide injection system has been made in anticipation of a maximum future load of 30,000,000 cu. ft. per day. Surplus residue gas from the five gasoline plants serving the pool will be gathered and compressed, and that to be injected in the northwestern portion of the block will be handled by one compression service agent and that for the southeastern by a second service agent.

Installation of hydrogen sulfide treaters to reduce the content to 1 grain per 100 cu. ft. is planned, together with dehydrators so gas freezing will not obstruct operating conditions. Oxygen content will be held below 1 per cent.

Additional Compressor Equipment

Initial boosting equipment in the northwestern sector is scheduled for not less than 8,000 M.c.f. per day and pressures to 450 p.s.i.; that for the southeast for 3,250 M.c.f. per day and 275 p.s.i. At the start only the booster equipment for the northwestern operation will be installed, which will serve the entire block. That for the southeastern portion will either be installed within 2 years or the phase reassigned to the northwestern service agent. Surveys have shown that at the present time there are approximately 13,000,000 cu. ft. of returnable residue gas available for injection. Present average gas-oil producing ratio is 800 cu. ft. per bbl.

Careful selection of the location of the wells to be converted to injection service, on pattern-type arrangement, is planned, and in some cases corrective work such as deepening and the installation of packers may be necessary.

In preparing estimates on probable future performance, the engineers made careful comparisons with other repressure work, including one operation in the Panhandle producing from the dolomite, another from the granite wash, the North and South Burbank projects in Oklahoma, and the Scott, Teeter, Madison and Delmalorie-Sowder programs in Kansas.

E. O. Bennett, engineering consultant, was engaged by the association to make an independent examination of the West Pampa proposition, and conclusions similar to those of the engineering committee were reached. An increased recovery of over 50,000,000 bbl. was predicted.

The gas injection should greatly extend and magnify present gasoline plant operations. The system of gas handling to be employed is shown in Fig. 5.

Details of Organization

The participants in the West Pampa Repressuring Association have been very commendatory of the intensive efforts of the temporary executive committee which organized the general formulation of the activity and handled the numerous and complex details necessary in the ground work. Committee membership was composed of J. B. Steele, chairman, (Kewanee); C. A. Daniels (Phillips); G. H. Card (Stanolind); H. J. Gibbons (Skelly); H. M. McClain (Magnolia); D. A. Powell (Drilling and Exploration Co.), and N. E. Maxwell (Cities Service).

The legal committee was comprised of W. W. Heard, chairman (Stanolind); J. E. Cochran, Jr. (Kewanee); R. B. Burgess (Phillips); W. P. Z. German (Skelly), and F. H. Bacon (Cities Service).

A simple, easily workable and equitable plan has been devised to have each participant share in the cost, on the basis of the ratio of the individual's pipe-line runs during the 6 months prior to first repressuring, to the total runs from all leases in the repressuring area during the same period.

Each participant can either pay his share on a 10-year installment plan, together with interest, or in a lump sum in advance. Similarly, the gas boosting and association expense is to be paid to the gas-compression service agents monthly by each participant, on the ratio of his pipe-line runs for the preceding month to the total pipe-line runs.

Acknowledgement

Grateful acknowledgement is made to the West Pampa Repressuring Association for permission to publish this article, and to the Geological Committee for certain of the illustrations.

ESTIMATES FOR PROJECT OPERATION

Ultimate Recovery Without Repressuring, bbl.	115,000,000
Additional Oil by Repressuring, bbl.	
Minimum	17,250,000
Maximum	40,250,000
Initial Gas Injection Rate, cu. ft. per day	7,000,000
Later Gas Injection Rate, cu. ft. per day	30,000,000
Initial Booster Requirements, hp.	950
Later Booster Requirements, hp.	4,000
Initial Cost of Field Repressuring System, Treaters, Dehydrators (Approx.)	$425,000
Final Cost of Field Repressuring System (Approx.)	$803,000
Eventual Gas Volume Injected, cu. ft.	212,000,000,000
Final Cost of Gas Injection (Approx.)	$6,074,000
Approx. Future Operating Life, years	21

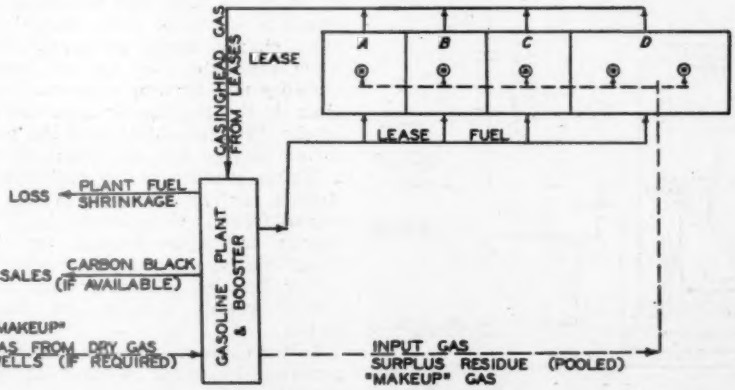


Fig. 5—Flow diagram of gas-handling procedure to be used

Production of Distillate Fuel Oils by Thermofor and Houdry Catalytic Cracking

by S. D. Dalton* and S. P. Cauley†

Distillate fuel oils, some of which can be marketed both as burner fuel and as diesel fuel, are produced economically by Houdry or T.C.C. catalytic-cracking processes, these authors show in this article. Cetane numbers range from 40 to 55, well within the normally required range for diesel engines generally. Carbon residues of these products will vary between 0.05 per cent and 0.12 per cent, normally. Fuels shown here lack front-end volatility and it is found more advantageous to blend with naphtha or No. 1 fuel oil for desired volatility, rather than to cut to a light end at the expense of gasoline or in-between fractions. Data are given to show how distillate fuels and other product yields may be varied to suit conditions.

IN the past few years catalytic cracking has been considered largely as an extremely valuable tool for the production of aviation base stock and other 100-octane-gasoline components. In addition to its value as a producer of aviation-gasoline components catalytic cracking of the Thermofor and Houdry types offers many advantages to the refiner for peacetime operation.

It is well known throughout the industry that the catalytic cracking processes can be relied upon to produce high yields of excellent-quality motor gasolines, but the fact is often overlooked that the catalytic units if operated under the proper conditions can give high yields of gasoline and at the same time produce large quantities of excellent distillate fuel oils.

Many industry statisticians are predicting an increased demand for light distillate fuel oils after the war and if the refiners are to maintain production of high-quality motor fuels and increase the production of distillate fuel oils it will be necessary in many cases to review the existing methods of processing.

In general it appears that the demand for kerosene and No. 1 fuel oils will continue to be supplied from the virgin fractions of suitable crude oils; so the problem facing many operators is the selection of proper facilities to process the fractions of the crude oils boiling above the kerosene range to produce maximum quantities of gasoline and light distillate fuel oils. Two general processing methods are available to convert these fractions into gasoline; thermal cracking and catalytic cracking. Wide experience with thermal cracking of gas oils and reduced crudes has demonstrated that while this method will produce good yields of high-octane gasoline the gasoline is always accompanied by the production of cracked fuel oils of the Bunker C boiling range, and that if distillate fuel oils of the No. 2 fuel-oil boiling range are produced they are usually of poor stability and have poor burning characteristics. In addition the production of distillate fuel oils by thermal cracking usually results in substantially lower yields of gasoline from the charge stock. Satisfactory distillate fuel oils can be produced by thermal cracking but they usually require severe chemical treatment with a resultant increase in product cost and in product loss.

On the other hand experience in the last few years with the operation of Houdry and T.C.C. catalytic cracking units has shown that the catalytic process can be operated to produce predominantly products boiling in the gasoline and No. 2 fuel-oil range, and that the light distillate fuel oil is of sufficiently high quality to be readily acceptable to the trade.

The yields and quality of the products produced by catalytic cracking are influenced by a number of variables. The most important of these are:

1. Crude source of the charge stock.
2. Boiling range of the charge stock.
3. Type of catalyst used.
4. Operating conditions.

The source of the crude oil from which the charge stock is prepared has a major influence on the quality of distillate fuel oils produced by catalytic cracking. The paraffinic-type charge stocks generally produce distillate fuel oils of better stability and burning characteristics than do the naphthenic-type charge stocks. Distillate fuels from the paraffinic charge are characterized by a higher gravity and a higher hydrogen content than are those obtained from naphthenic stocks. The higher hydrogen content in the paraffinic-type structure results in better burning characteristics and higher cetane number in these stocks.

Sulfur content of the charge stock governs the sulfur content of the distillate fuels although not to as great an extent as in thermal crack-

*Refinery engineering division, Socony-Vacuum Oil Co., Inc. †Technical service laboratories, Socony-Vacuum Oil Co., Inc.

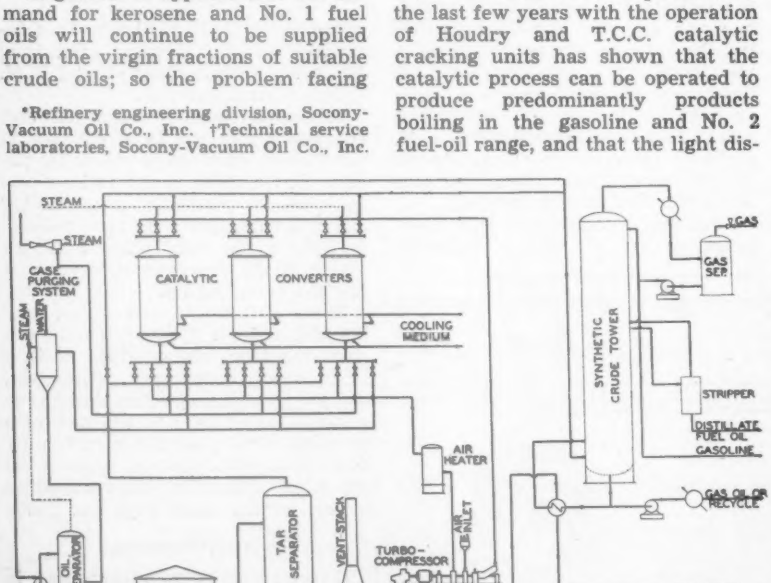


Fig. 1—Simplified flow diagram of Houdry catalytic-cracking process

TABLE 1—YIELDS AND PROPERTIES OF PRODUCTS, USING VARIOUS CHARGE STOCKS AND TWO DIFFERENT CATALYSTS

Charge stock:	1	2	3	4	5	6	7	8
Crude source	Mid-Cont.	Mid-Cont.	Mid-Cont.	Mid-Cont.	Mid-Cont.	Mirando	Mirando	Coastal
Gravity, °A.P.I.	30.8	32.8	32.8	33.1	33.9	22.4	27.7	28.0
A.S.T.M., 10%	490	478	483	445	473	465	420	490
A.S.T.M., 50%	660	566	592	572	574	583	511	550
A.S.T.M., 90%	910	750	713	705	710	*700	633	640
Operating conditions:								
Average temperature, °F.	874	857	843	839	863	865	841	850
Pressure, p.s.i.g.	9	12	7	9	12	30	23	28
Space velocity, V/V	1.0	1.5	1.8	2.05	2.03	1.88	1.28	1.25
Cycle length, min.	36	36	41	41	41	42	48	60
Recycle ratio (Bbl. fresh feed / Bbl. recycle)	0	0	.55/1	.45/1	.25/1	0	0	0
Catalyst	Clay	Synthetic	Synthetic	Synthetic	Synthetic	Clay	Synthetic	Synthetic
Yields—% volume fresh feed:								
Gasoline	39.5	37.0	52.0	50.9	43.0	35.0	43.0	40.0
Light distillate fuel oil	39.5	38.2	18.4	25.0	32.0	47.4	40.7	47.1
Heavy gas oil	14.2	16.0	8.5	3.8	4.6	11.7	4.3	2.2
B-B, coke, gas, and loss—volumetric	6.8	8.8	20.1	20.3	20.4	5.9	12.0	10.7
Properties:								
Gasoline:								
R.v.p., p.s.i.a.	10.0	10.0	10.0	9.1	10.0	11.0	4.0	6.5
End point, °F.	400	400	421	418	417	410	410	425
O.N.-C.F.R.R.	87.7	86.0	87.0	87.0	88.0	...	...	...
Light fuel oil:								
Gravity, °A.P.I.	32.0	31.0	31.5	30.0	32.7	24.1	25.0	25.5
A.S.T.M., initial	388	424	357	386	425	438	449	450
10%	510	490	501	498	505	470	478	490
50%	530	525	528	530	535	510	508	525
90%	597	585	570	577	591	592	573	600
End point	635	630	618	623	635	648	631	660
Color	2	2	1½	1	1	2	1½	2
Heavy gas oil:								
Gravity, °A.P.I.	26.0	26.0	17.5	16.2	20.8	14.8	8.6	8.0
A.S.T.M., initial	600	600	499	501	510	488	589	600
10%	630	630	616	625	623	588	626	650
50%	...	...	684	...	680	689	675	700

*75 per cent.

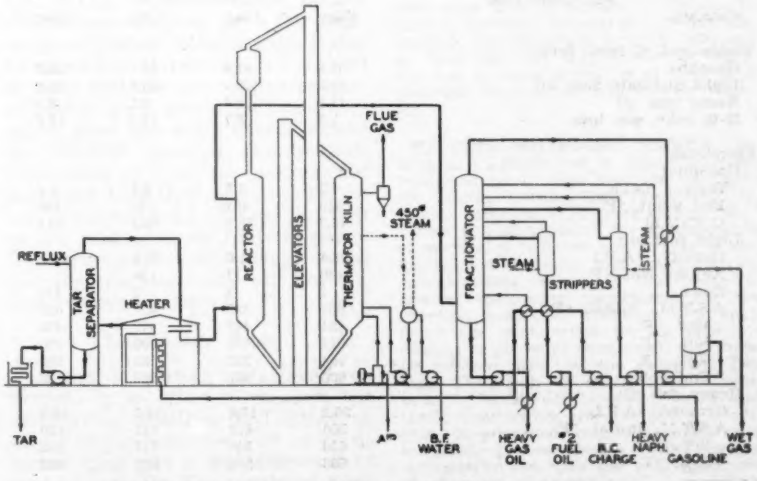
ing. Catalytic cracking is an effective way of desulfurizing high-sulfur stocks and in general the distillate fuel oils produced in catalytic units will be of lower sulfur content than the charge stock.

The boiling range of the catalytic charge will to some extent control the yields and quality of the distillate fuel oils. The high-boiling charge stocks when cracked once through usually give higher yields of material boiling above the light distillate fuel-oil range and the quality of the distillate fuels will be somewhat inferior to those prepared from lower boiling charge stocks.

The choice of catalyst is quite important and may be used to offset the quality disadvantages of poor charge stocks. Clay catalyst and Houdry synthetic catalyst are available for the Houdry process and natural clay catalyst and Socony-Vacuum bead catalyst for the T.C.C. Clay catalysts usually give a less stable distillate fraction than does the synthetic catalyst although this effect appears to be of different magnitude for the two processes. Distillates produced from clay catalyst in the T.C.C. process appear to be of about the same quality as those produced from Houdry synthetic catalyst by Houdry cracking and the distillates produced from bead catalyst are of superior quality. The synthetic catalysts are also the best desulfurizing agents.

Operating conditions for catalytic units may be varied over a wide range to adjust product distribution and to compensate for catalyst activity. Both the Houdry and T.C.C. processes are usually operated at fairly low temperatures to take advantage of high liquid recoveries. The mild operating temperatures of these processes contribute substantially to the production of stable distillate fuel oils. The regeneration of the catalyst to a low residual carbon content, a characteristic of both processes, insures cracking on a clean and active catalyst and aids in the production of high-quality distillates. The use of large quantities of steam in the reaction zone should be avoided if the operation is directed toward fuel-oil quality as steam favors the formation of compounds that inpair stability.

Houdry or T.C.C. units may be operated with a recycle stream returned to the reactors and if it is desired substantially all the material boiling above the required distillate range may be converted to lower-boiling products. By recycling the heavy ends, it is practical to operate to produce no more than 3 to 5 per cent of liquid material boiling over 630° F. By proper choice of the recycle ratio and boiling range of the recycle stock the catalytic processes may be operated to give maximum gasoline and light distillate fuel oils



Simplified flow diagram of Thermotor catalytic-cracking process

with negligible production of Bunker fuel oil material. Actually the small amount of high boiling material that is produced by catalytic cracking is very fluid and can be used to cut back asphalts or tars or may be burned in the refinery.

The Houdry fixed-bed catalytic cracking process has been operated commercially since 1937 and is well known to the industry. Fig. 1 is a flow diagram of a conventional Houdry plant and illustrates the fractionating tower section used to prepare gasoline, light fuel oils and recycle or bottoms.

Table 1 shows the results of some typical Houdry operations as practiced in Socony-Vacuum plants. These runs were picked at random and cover a rather wide range of space velocity, catalytic activity and charge stock. It can be seen from Runs 1, 7, and 8 that catalytic gasoline is formed without the production of high-boiling material. In Run 1 the charge stock contains more than 50 per cent of material boiling above 630° F., but the finished products contain only 14 per cent of material boiling above 630. On Runs 7 and 8 the charge stock all boils below 640° F. and the production of 40 per cent of catalytic gasoline results in only 2 to 4 per cent of material of heavier boiling range than the charge stock. Thermal cracking of any of these charge stocks to comparable gasoline yields would result in the production of very substantial quantities of Bunker-type fuel oil.

Runs 2, 3, 4, and 5 show the effect of recycling on product distribution. By varying the recycle ratio from 0 to 0.55/1 the gasoline yield is changed from 37 to 52 per cent and the light distillate fuel-oil yield from 38.2 to 18.4 per cent. The ability to alter product distribution can be of considerable value to a refiner as it allows a variation in operation to take advantage of current price differentials and seasonal demand variations.

TABLE 2—GAS OILS (DISTILLATE FUEL OILS) PRODUCED BY DIFFERENT OPERATING CONDITIONS

Charge stock:	Oklahoma City gas oil		
Gravity, °A.P.I.	41.4	35.3	31.4
Pour point, °F.	—25	25	60
Aniline No., °F.	156	174	188
A.S.T.M., initial, °F.	404	501	510
10%, °F.	440	536	582
50%, °F.	466	584	710
90%, °F.	514	655	
Vol. % total heavier than gasoline	58.0	53.5	51.2
Properties of total gas oil:			
Gravity, °A.P.I.	39.9	33.4	28.5
Aniline No., °F.	148	146	155
Pour point, °F.	—25	20	70
Con. carbon, % wt.	0.04	0.04	0.09
S.U.V. at 100° F., sec.	<39	<39	46
A.S.T.M., initial, °F.	410	458	450
10%, °F.	436	497	500
20%, °F.	443	512	525
30%, °F.	448	523	555
40%, °F.	455	534	590
50%, °F.	461	545	628
60%, °F.	469	558	666
70%, °F.	478	572	703
80%, °F.	489	590	727
90%, °F.	509	618	759
End point, °F.	605	678	>760
Rec., % vol.	99.0	99.0	90.5
Gas oil boiling below 630° F., estimated vol. % charge	58.0	50.0	28.2
Gas oil boiling above 630° F., estimated vol. % charge	0	3.5	23.0

TABLE 3—YIELDS AND PROPERTIES OF PRODUCTS MADE BY DIFFERENT OPERATIONS

Charge stock:	1	2	3	4
Crude source	Mid-Cont.	California	California	70% Coastal 30% Paraf.
Gravity, °A.P.I.	33.3	32.8	32.9	27.3
Aniline No., °F.	157	133	138	147
A.S.T.M., 10%, °F.	480	428	428	458
50%, °F.	594	488	497	582
90%, °F.	721	585	614	†700
Operating conditions:				
Average temperature, °F.	875	833	844	935
Pressure, p.s.i.g.	6.5	6.2	5.5	6.5
Space velocity, V/V	2.12	0.72	1.7	1.71
Cat.-to-oil ratio, V/V	1.6	2.0	1.7	1.81
Recycle ratio (Bbl. recycle / Bbl. fresh feed)	0.38/1.0	0	0.33/1.0	0
Catalyst	Clay	Clay	Clay	Clay
Yields—vol. % fresh feed:				
Gasoline	37.9	41.8	55.7	35.9
Light distillate fuel oil	41.0	43.1	30.9	42.6
Heavy gas oil	13.8	5.4	3.1	8.9
B-B, coke, gas, loss	7.3	9.7	11.3	12.6
Properties:				
Gasoline:				
R.v.p., p.s.i.a.	4.0	5.9	2.8	4.9
End point, °F.	410	401	449	420
O.N.-M.M.	76.7	76.9	70.3	79.7
Light fuel oil:	(*)			
Gravity, °A.P.I.	33.4	31.6	30.0	26.5
Aniline No., °F.	140	117	124	
Color	1	2	1	1½
A.S.T.M., initial, °F.	454	395	427	430
10%, °F.	484	442	477	478
50%, °F.	512	470	508	520
90%, °F.	564	522	565	590
End point, °F.	600	561	597	625
Heavy gas oil:				
Gravity, °A.P.I.	26.2	17.8	14.2	16.9
A.S.T.M., initial, °F.	500	478	481	450
10%, °F.	616	546	571	592
50%, °F.	666	591	652	688

*Cetane No. 43.0 S.U.V. at 100° F., 35 sec. †84 per cent.

No Chemical Treatment

The few properties shown for the commercial fuel oils are not particularly significant as indications of quality. All of the fuels shown in Table 1 were commercially marketed without chemical treatment.

It should be noted that the fuels shown are all lacking in front end volatility. It is of course possible to make catalytic fuel with the front end distillation required by No. 2 fuel-oil specifications but in practice it is more economical to cut a fairly high end-point gasoline and to blend the catalytic fuel with straight-run naphtha or No. 1 fuel to the correct volatility. This method is practiced because the heavier ends of the catalytic gasoline are of excellent octane rating.

Table 2 shows some laboratory data on Houdry cracking of three cuts from Oklahoma City gas oil. The three charge stocks were cracked to give approximately the same coke laydown and the results illustrate the effect of the charge-stock boiling range on the yield of distillate fuels. The 400°-500° F. cut gives no material boiling above 630° F., the 500°-650° F. cut gives only 3½ per cent boiling above 630° F., and the heavy cut that contains over 80 per cent boiling above 630° F. is cracked to yield only 23 per cent boiling above 630° F. The cracking conditions chosen are not necessarily optimum for the heavy fraction and

TABLE 4—VARIATIONS IN YIELDS AND PROPERTIES FROM DIFFERENT CRUDES

	Okla. City	California	East Texas
Charge stock:			
Crude source			
Gravity, °A.P.I.	35.7	33.6	32.7
Aniline No., °F.	189	135	166
A.S.T.M., 10%, °F.	530	438	532
50%, °F.	636	484	580
90%, °F.	730	572	660
Operating conditions:			
Average temperature, °F.	825	890	824
Pressure, p.s.i.g.	10.0	10.0	10.0
Space velocity, V/V	1.8	1.4	0.8
Cat.-to-oil ratio, V/V	1.8	2.2	1.7
Recycle ratio, Bbl. recycle / Bbl. fresh feed	0	0	0
Catalyst	Bead	Bead	Bead
Yields—vol. % fresh feed:			
Gasoline	45.4	46.4	45.1
Light distillate fuel oil	28.2	38.8	43.2
Heavy gas oil	7.9	0	0
B-B, coke, gas, loss	19.4	14.8	11.7
Properties:			
Gasoline:			
R.v.p., p.s.i.a.	9.7	9.5	9.5
End point, °F.	398	410	403
O.N.-M.M.	80.7	82.6	80.6
Light fuel oil:			
Gravity, °A.P.I.	32.0	29.0	28.8
Aniline No., °F.	165	113	137
Color	...	...	...
A.S.T.M., initial, °F.	425	430	450
10%, °F.	448	452	510
50%, °F.	490	481	544
90%, °F.	570	552	620
End point, °F.	635	582	686

more severe operating conditions or recycling could be employed to still further reduce production of heavy gas oil.

Production of Plants

The moving-bed T.C.C. process was placed in commercial operation in October 1943, and there are now 33 reactors in operation. All of these plants are producing aviation-gasoline components and so no commercial data are available for typical motor gasoline operation. Postwar operation for peacetime products is expected to be less severe than that now practiced and will give substantially higher liquid recoveries.

Fig. 2 is a simplified flow diagram of a T.C.C. unit.

Table 3 presents typical data on commercial operation for T.C.C. units. Each set of data represents a 1-month plant average. All of the data are on clay catalyst as no commercial data are yet available for cracking on synthetic catalyst.

The production of distillate fuel oils by the T.C.C. process is subject to the same general variables as the production by the Houdry process. The T.C.C. fuel oils made from clay catalyst appear to be definitely superior to those made from clay on Houdry units and it is believed that this is due to the fact that in the T.C.C. process the regeneration step is carried out in a separate vessel. This minimizes the possibility of contact of the oil vapors with carbon dioxide and oxygen and results in a fuel of high stability.

Table 4 shows typical laboratory results from cracking three different stocks on bead catalyst.

All indications of the laboratory tests are that the fuel oils produced over the bead catalyst are of superior quality.

The ordinary routine laboratory tests for determining gravity, boiling range, and color are not of great significance in determining the value of the distillate fuel oils. The two characteristics most desired in a distillate fuel oil are good burning quality and good storage stability. Good burning quality is largely associated with the carbon-to-hydrogen ratio of the fuel and therefore with the paraffinicity of the fuel. U.O.P. characterization factors and aniline numbers are a fair indication of fuel-oil paraffinicity. It can be generally stated that T.C.C. and Houdry fuel oils are of greater paraffinicity than would be fuels prepared from the same charge stocks by thermal cracking. Commercial experience of catalytic fuel oils has indicated that they are suitable fo use in all gun-type burners but that in the case of some fuels prepared from very naphthenic charge stocks burning characteristics will not satisfy pot-type burners.

Laboratory Tests

Several laboratory tests have been devised in an effort to measure the stability of distillate fuel oils. Socony-Vacuum employs two of these tests which give a fair indication of fuel-oil stability. The results of these tests coupled with many years of experience in the commercial market of catalytic fuel oils have indicated that the oils prepared from T.C.C. or Houdry cracking are of satisfactory stability for ordinary commercial use. In many cases the fuels are just as stable as the average straight-run cut of the same boiling range. One standard test used throughout the industry as a guide to fuel-oil stability is carbon residue determined on 10 per cent bottoms. For all the catalytic fuels we have tested carbon residues are quite good and are in the order of 0.05 per cent to 0.12 per cent.

In some cases it is desirable to market a fuel that can serve as both a burner fuel and a diesel fuel. Houdry and T.C.C. fuel oils prepared from all but the most naphthenic charge stocks are characterized by cetane numbers in the range of 40 to 55. Tsese cetane numbers are sufficiently high to satisfy requirements of the majority of the types of diesel engines currently in use.

In conclusion it can be stated that T.C.C. and Houdry catalytic processes offer an attractive means to the average refiner for preparing maximum yields of high-quality motor gasolines and high-quality distillate fuel oils, and that the flexibility of the two processes is such that they can serve as an extremely valuable tool for the balancing of refinery-product distribution.

BOOKS

FUNDAMENTAL RESEARCH ON OCCURRENCE AND RECOVERY OF PETROLEUM, 1943. Published by American Petroleum Institute, 50 W. 50th Street, New York, through private subscription. 197 pp.

The purpose of this annual volume is to present, under a single cover, all of the published results arising from fundamental research studies on the occurrence and recovery of petroleum, sponsored by the institute. Many of the papers have been published previously in various scientific journals and periodicals, thereby accomplishing a wide diffusion of these data not only to the oil industry, but to other industries as well. It is proposed to publish this volume annually.

PROCESS EQUIPMENT DESIGN. By Herman C. Hease and J. Henry Rushton. Published by D. Van Nostrand Co., Inc., 250 Fourth Avenue, New York. 580 pp. Regular edition, $7.50, text edition, $6.

This volume presents the fundamentals of mechanics, machine and structural elements, and economic and manufacturing considerations related to the design of process equipment, particularly for the chemical industries. Although few engineers are ever called on for complete designs of pieces of equipment, they must be familiar with all the foregoing factors. The book is based upon several years of lecture and laboratory work with senior engineering students and is adaptable to advanced classes familiar with industrial process design, with physical metallurgy, and with the unit operations of chemical engineering.

MAGNITUDE

This is not a snowdrift. This great pile is composed entirely of machined chips of high-strength aluminum alloy. ¶ These chips are produced by the machining operations on the A-26 Invader wing spar caps, fabricated into complete wing assemblies by Beechcraft. ¶ The magnitude of the production job assumed by Beechcraft on the A-26 Invader program is symbolized by the fact that it takes a bulldozer to sweep up the chips from the machining operations on only eight parts of the thousands incorporated into the A-26 Invader wings.

Beech Aircraft CORPORATION

BEECHCRAFTS ARE DOING THEIR PART

WICHITA, KANSAS, U. S. A.

A Floating-Dock Pump Station

This article describes how Pure Oil Co. met the problem of protecting its Cumberland field properties when natural drainage was made impossible by construction of a flood-control project

by A. E. Bedell*

WHEN the federal Government decided upon the Red River Denison Dam flood-control and power project in southern Oklahoma, its completion would have flooded the Cumberland oil field (in Marshall and Bryan counties) except for the construction by Army engineers of a system of dams and dikes, which diverted the flow of the Washita River around the field and protected it from back water.

This left to The Pure Oil Co., discoverer of the field, the problem of disposal of such rainfall, seepage, and ground water that might accumulate within the field itself. Some conception of magnitude of the surface water to be handled may be gained if it is realized that ½ in. of rainfall in 24 hours distributed over the 12.5 sq. miles comprising the watershed is equivalent to 110,000,000 gal. per day. Such an average daily rainfall can be anticipated over a period of 60 days, with a possible daily maximum of 15 times this amount.

Analysis of available storage capacity and maximum accumulation of surface water that could be absorbed without inundation of the field indicated that a pumping station having a capacity of 70,000 g.p.m. would be adequate. Physical and economical considerations called for the pumps and auxiliary equipment to be mounted on a dock, floating in shallow water at a natural low point of the field, which was further excavated, forming a sump 50 ft. by 90 ft.

A floating dock 85 ft. long and 42 ft. wide, having a 5-ft. draft and a 3½-ft. freeboard with a 25-ft. high totally enclosed superstructure to house the equipment, was evolved (Fig. 1). Major equipment on the dock consists of two 35,000-g.p.m. centrifugal pumps, directly connected to 600-hp. diesel engines; two 100-kva generators (belted to the main driving units), and a 100-kva and a 25-kva gas-engine-driven auxiliary generators. Auxiliary equipment consists of 10 pumps for miscellaneous service such as engine cooling, spray water, makeup, gland water and priming; two starting air compressors; together with necessary exchangers, cooling coils, and water-filtering system. The fuel-oil system is located on land, the oil being fed to the dock through flexible hose connections.

Construction of Discharge Lines

Water discharge from the two pumps is through 36-in. diameter pipes, merging by means of a "Y" member into one 60-in. line 800 ft. long. The two 36-in. discharge lines have approximately an 80-ft. unsupported span, but are so braced with three exterior trusses that they not only support their own load and wind load on dock, but also the walkway permitting access to and from the dock. This construction is indicated in Fig. 2. At each end of both discharge pipes are ball-and-socket joints, permitting considerable movement each side of the center line. Both ends of these pipes are fixed, one end on the dock and the other on land. The hydraulic thrust and piping load is carried on the land end and the pumps are protected against piping strains by sleeve expansion joints, permitting 6-in. movement. Lack of availability of commercial designs necessitated

Fig. 3—Discharge of 60-in. penstock pipe into stilling basin. Concrete spillway in right foreground

*Graver Tank & Mfg. Co., Inc.

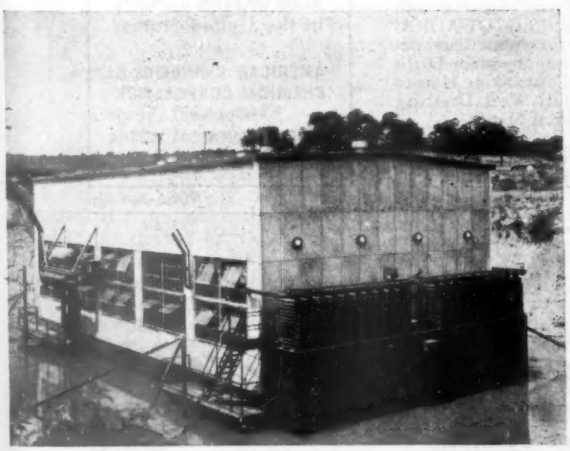


Fig. 1—Exterior of dock, from forward end

Fig. 2—Discharge lines to penstock line

"General Mud"

FRIEND OR FOE?

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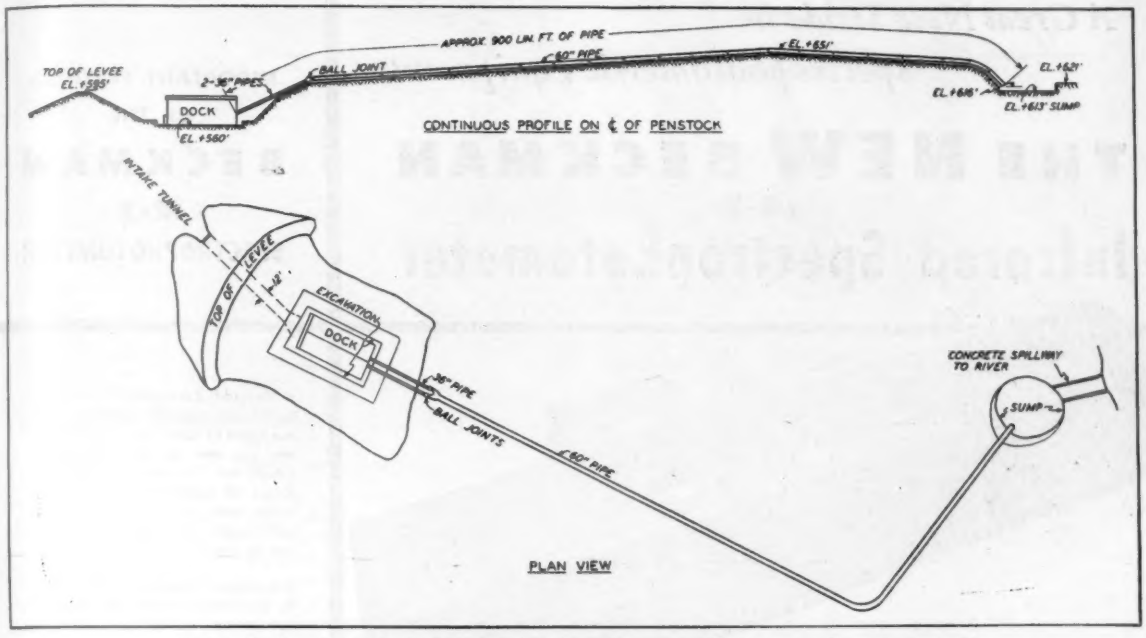

Fig. 4—Dock and penstock piping (top) and continuous profile of center line of penstock

special designs and fabrication not only of the supporting elbows, ball joints and expansion joints, but of 36-in. swing check valves inserted to protect the main engines against reverse rotation in case of an accident.

The 60-in. discharge line is supported on concrete piers, spaced on an average every 12 ft. and provided with semicircular steel saddles, permitting the movement of pipe with temperature changes. It is anchored at both ends and at a point about two-thirds of its length with a sleeve expansion joint approximately central in each section. There is one 75° bend in the horizontal and a 45° bend as it discharges into the stilling basin as shown in Fig. 3. Discharge from this basin to reservoir is through concrete spillway shown at lower right of photograph. The layout of the dock and discharge piping, as well as a continuous profile on the center-line of the penstock is shown in Fig. 4.

Factors Considered

Several important factors, primarily matters of time element, had to be considered; namely (1) a quick completion date, since the pumping station had to be available at the time of closing the dikes and the start of impounding water by the dam; (2) synchronization of delivery of equipment to meet with an accelerated and closely timed erection schedule; (3) close and continual cooperation between Pure Oil Co.'s and the fabricator's engineers; since design engineering could not be completed in its entirety before placing orders, but had to proceed hand in hand with the fabrication and erection schedule and to suit quickly available and frequently not originally planned on equipment and materials; (4) the advantage of, as far as possible, having the maximum amount of equipment fabricated and installed by one contractor.

General engineering, supervision, and purchase of mechanical equipment was handled by Pure, while Graver Tank & Manufacturing Co., Inc., did the detail engineering of the dock, penstock piping and incidentals, fabrication of all plate and structural material and erection and installation of all equipment. Penstock piping was fabricated at one of Graver's plants, and the dock and superstructure at another. The dock proper was assembled by Graver's erection division, whereas the dock superstructure, all mechanical equipment, penstock piping—including all foundations and structural supports—were installed by Graver's construction division.

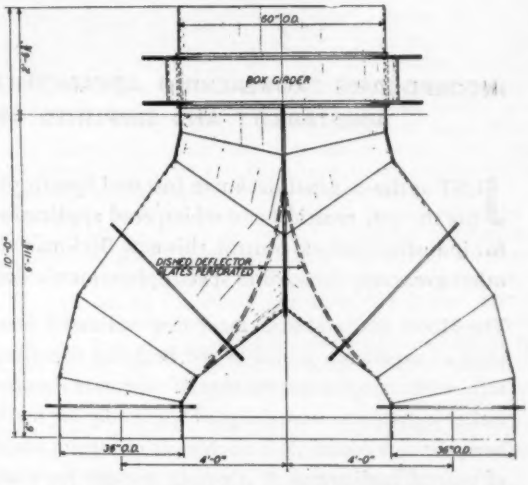

Fig. 5—Transition "Y" piece between two 36-in. and 60-in. penstock piping

The large-diameter penstock pipes were shop fabricated in as long sections as were practical for shipment (the 36-in. pipes being approximately 75 ft. long, and most sections of the 60-in. pipe approximately 42 ft. long) so as to minimize the amount of field welding. To facilitate shipping and to avoid, as far as possible, damage in handling, all the pipe was fabricated in Graver's Oklahoma plant, from which it was possible to deliver the material to the job site by truck. As fast as a few sections were completed in the shop they were delivered to the job and immediately installed.

Since in operation the piping system might be subject to a vacuum as well as pressure, unusual precautions were taken during fabrication, as well as during subsequent handling and assembly, to maintain the pipe as close to round as possible. The 36-in. pipe was constructed of ½-in. plate, with 2½-in. by 2½-in.

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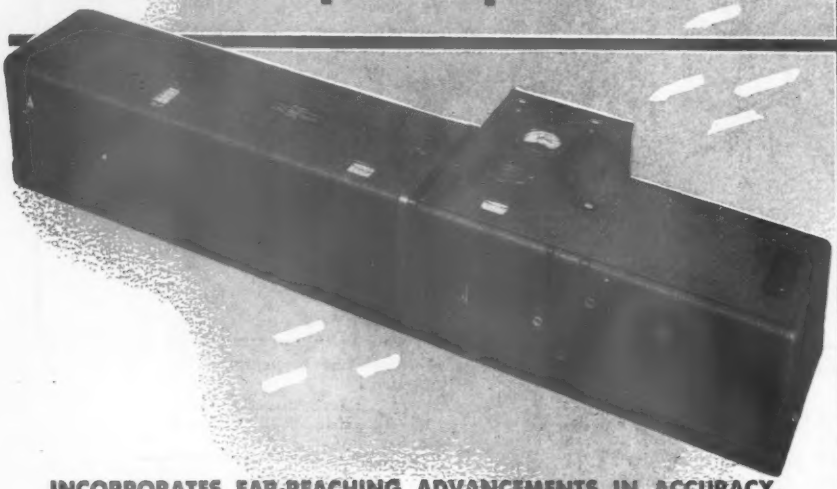

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● ***Constant Temperature*** **insures accuracy at *all* wavelengths. The monochromator and cell compartments are thermostated, eliminating the uncertainty of inadequate "temperature compensation" and making a constant-temperature room unnecessary.**

● ***Quick Easy Readings*** **can be made directly in percent transmission and optical density, and provisions are made for direct-connecting a standard potentiometer-type recorder. The wavelength range is 1 to 15 microns and wavelengths can be selected either by a continuous wavelength drive calibrated directly in microns or by a 17-position stop-mechanism that greatly simplifies routine analysis operations. Accessory equipment includes a motor drive for continuous wavelength scanning.**

● ***Constant Radiation*** **at all times is another important advancement. The source of radiation is a photo electronically stabilized Nernst lamp which insures constant radiation regardless of line voltage fluctuations.**

● ***Hermetically Sealed,*** **the optical path is free of CO_2 and water vapor. Two-stage drying protects precision optical elements.**

These are only a few of the improvements incorporated in this new Beckman development but they are typical of many unusual features to be found in the IR-2 that make this the most advanced Spectrophotometer available.

Fig. 6—Interior view, looking aft

Fig. 7—Diesel engine and motor generator set

by ⅞-in. stiffening angles on 8⅓-ft. centers, and further reinforced with three exterior angle trusses (Fig. 2). The 60-in. pipe was mainly of ⅜-in. plate (although a smaller amount of slightly heavier plate was used in order to make use of available stock) with 4-in. by 3½-in. by ⅜-in. stiffening angles on approximately 12-ft. centers.

One of the interesting features of the penstock piping system was the transition "Y" piece (Fig. 5) between the two 36-in. discharge lines and the 60-in. main line. It was completely shop fabricated, of welded plate construction, installed as a unit, and weighed more than 6 tons. It was "streamlined" to eliminate shock due to sudden changes of direction of the flow and the box girder at the 60-in. end acts as a support as well as an anchor for the land end of the discharge pumps.

Control of Pump Discharges

While the pump discharges are controlled by 36-in. electrically operated gate valves, swing check valves also were required in each line to protect the pumps and engines against reverse rotation. It was therefore necessary to design a valve of this type that could be fabricated quickly from steel plate. The body is of ½-in. plate. Valve plate is 1 in. thick, heavily reinforced, with 6-in. diameter operating shaft.

It was necessary to order a major portion of the plates and structural material from the mills before design work was hardly started, thus necessitating a final design that sometimes subordinated the best possible arrangement. Changes in design necessary to accommodate mechanical equipment available, rather than originally contemplated, were frequent. Design details of the hull can be observed to some extent from Fig. 8, a photograph taken during early construction stages.

The hull is divided into 51 water-tight compartments, 24 of which are water ballasted for trimming and two are utilized for fuel-oil storage. The compartments are formed by 4 longitudinal bulkheads, continuous from fore to aft, and 10 transverse bulkheads. The bulkheads are constructed of ¼-in. plate, and are 6 ft., 10½ in. high, extending from the hull to the water-tight deck. Longitudinal bulkheads are reinforced with 4-in. by 3-in by ⅞-in. angles on approximately 24-in. centers. Transverse bulkheads are on 7-ft. 8½-in. centers.

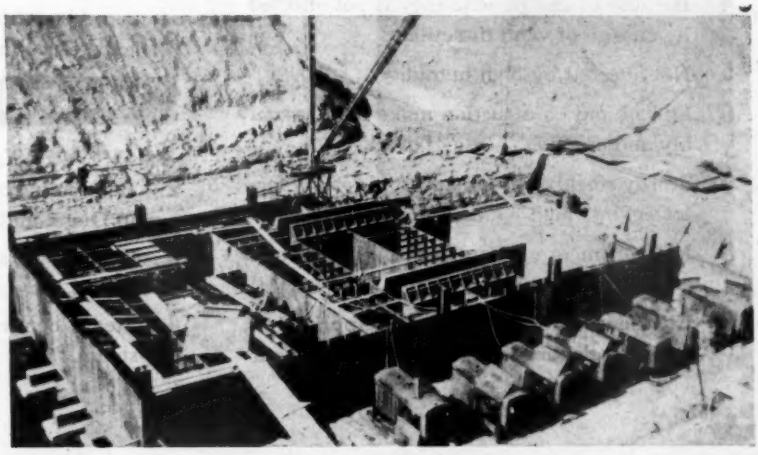
Side, end, and bottom plates are ⅜ in. butt welded throughout. Side plates are stiffened vertically by the six 12-in., 79-lb. beam columns supporting the superstructure which extend to the bottom (although spliced 3 ft. above the top deck, as a matter of convenience) as well as by the transverse bulkheads. Horizontal stiffness is obtained by the use of two 5-in. by 3½-in. by ⅞-in. angles. There are two decks, a water-tight and a false deck, spaced 13 in. apart. The water-tight deck is of ¼-in. plate, supported on the longitudinal and transverse bulkheads and stiffened with 4-in. by 3-in. by ⅞-in. angles. The false deck, supported from the water-tight deck, also is of ¼-in. plate, stiffened with 5-in. 6.7-lb. channels, and is of removable sections. The space between the two decks is utilized as a pipe trench for connections between the mechanical equipment.

The dock is constructed on a 5-ft. high permanent cradle, consisting of concrete piers capped by 14-in. by 16-in. wood beams. While the dock normally is kept floating, the cradle serves as a drydock during periodic inspections or for necessary repairs. The excavation for the cradle was in soapstone, which is hard when dry but very slimy when wet, and it was necessary to dike the excavation during construction.

Since the dock was erected in a pit, a special handling method for the plates and structural members was necessary. This was accomplished by means of a guyed derrick set on a 15-ft. high tower, located at one side and at the center of the pit, and having a 58-ft. boom. All material was handled from one setting.

The entire dock is enclosed under a superstructure of steel framing, 22 ft. in the clear under the roof trusses, covered with corrugated transite. Interior and exterior lighting is of the Holophane type.

Fig. 8—Dock hull during construction. Starboard side in foreground



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Gulf Coast Innovations in Gravel-Packing Technique

by E. H. Short, Jr.

GRAVEL packs, as a means of supporting unconsolidated formations, and for providing a filtering medium to exclude sand, have been employed in Gulf Coast wells for several years. During the past 2 years, this particular type of reconditioning has been on the increase, and many wells which had been shut down for some time, are now producing through a gravel pack.

The conventional gravel - pack method is still used where the producing formation is below the casing. In these cases the hole has been underreamed, which was done after the casing was set and cemented. Such a procedure has been applied not only to workover jobs, but also to new wells, as illustrated by Fig. 1. Usually where 7-in. casing has been set, the productive formation has been underreamed to 16 in. in diameter.

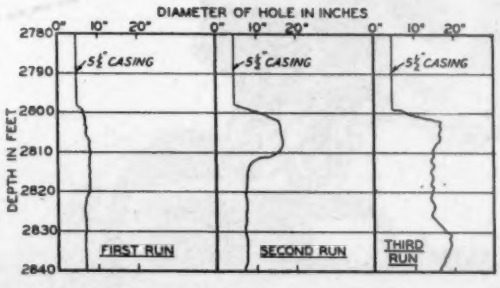
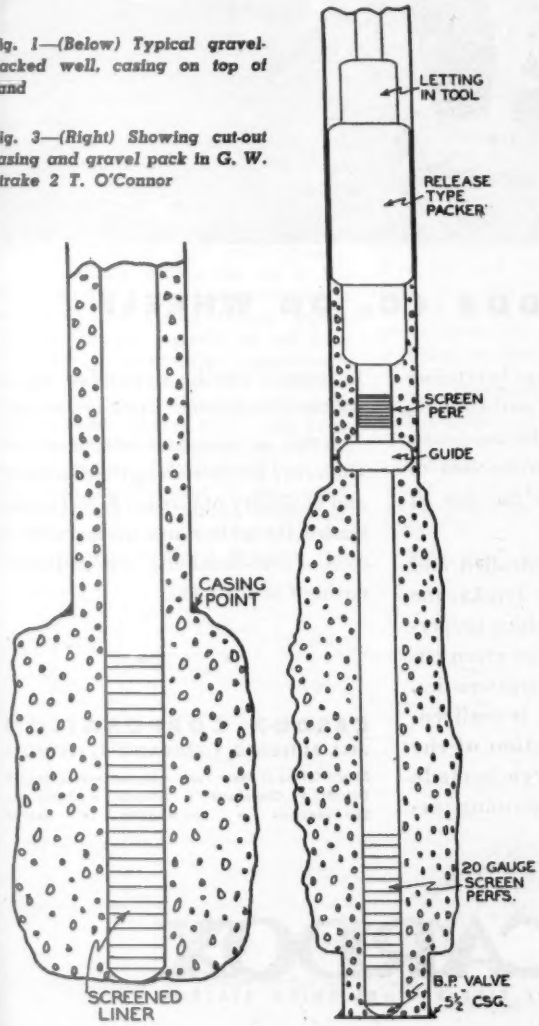


Fig. 2—Caliper log of G. W. Strake 2 T. O'Connor

Fig. 1—(Below) Typical gravel-packed well, casing on top of sand

Fig. 3—(Right) Showing cut-out casing and gravel pack in G. W. Strake 2 T. O'Connor



The hydraulic method of placing the gravel at the bottom of the well between a screen liner and the wall of the underreamed hole is practically the same now as it was when the method of gravel packing was introduced. However, the comparatively recent utilization of two separate tools, (a special casing milling tool and the calipers) in connection with gravel packing has not only enhanced the possibilities for obtaining a more satisfactory thickness of gravel pack, but has opened a new field for the application of this type of workover.

When a hole is underreamed below the casing, the chances are good that it will be reamed out to the intended diameter, except for a few irregularities. Many wells, however, have been completed by setting the casing on bottom, and then perforating it opposite the pay formation. Some wells completed in this manner has ceased to produce, either because of plugged perforations, or too frequent plugging of the tubing to permit economical operation. To gravel pack a well of this type it is necessary to cut out a section of casing.

The method of using a special casing milling tool, to cut out the casing in wells completed in this manner, and the checking of the underreamed hole diameter by means of calipers recently was demonstrated in the workover of George W. Strake 2 Tom O'Connor in the Telfener field, northeast of Victoria, Texas Gulf Coast. This well was completed 6 months ago in the Catahoula section of the Oligocene at a total depth of 2,858 ft. With bottom-hole pressure of approximately 1,200 p.s.i. the well flowed 50 bbl. per day through a screen on the bottom of a 2-in. string of tubing. Large quantities of sand were produced and after only a few months

(Continued on page 111)

Fig. 4—T. W. Slovik, production manager for G. W. Strake, and Paul Flower, driller, on gravel-pack workover job in the Telfener field

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Mechanics of Producing Oil, Condensate, and Natural Gas

The Volume Factor Per Barrel of Oil

*by Park J. Jones**

PART 15 OF A SERIES

Oil is defined as the liquid found in a stock tank when the production from a well is passed through one or more separators. The composition of oil and the quantity of oil per unit of well production depends upon separator conditions as well as upon the composition of the production. In turn, the composition of well production depends upon the composition of the reservoir fluids which are displaced into a well bore. This article is limited to reservoir liquids. And it is assumed that the composition of well production is the same as that of reservoir liquids. Under these assumptions, the composition of oil and the quantity of oil per unit of well production depends on gas-oil ratios. The higher the gas-oil ratio for a given well production, the smaller the volume of oil per unit of well production.

The volume factor for oil is the space occupied in a reservoir by a barrel of oil. Other things equal, the number of barrels of oil in a reservoir is inversely proportional to the volume factor for oil. The purpose of this article is to illustrate how volume factors vary with pressure, temperature, gravity of oil, and gas-oil ratios. Illustrations are for reservoir liquids, that is; for undersaturated oil, for oil at saturation pressure, and for oil at bubble-point pressure plus evolved solution gas.

THE space occupied by a barrel of oil is called a volume factor for the oil. Fig. 15-1 illustrates volume factors for a dead oil. When a barrel of dead oil is heated, the lighter constituents would vaporize if the pressure on the oil were not increased. The pressure required to prevent vaporization, but no more, is called bubble-point pressure. It is denoted by P_b. The curve labeled P_b in Fig. 15-1 corresponds to a bubble-point curve for a dead oil. At pressures greater than bubble-point pressure, oil is said to be undersaturated. The volume factor for an undersaturated oil is less than at bubble-point pressure. In other words, oil is compressible.

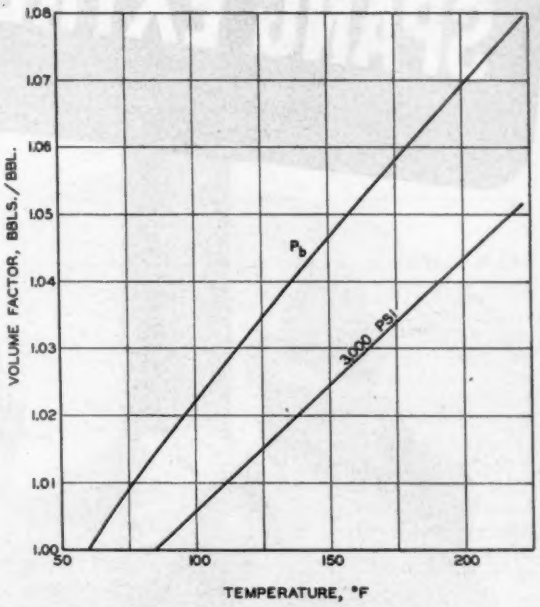

Fig. 15-2—Illustrating thermal expansion for a dead oil at bubble-point pressure P_b and at 3,000 p.s.i.a.

Compressibility of Oil

The slope per unit of space of the curves in Fig. 15-1 is called the compressibility of oil at a given temperature. For production purposes, compressibility is expressed as follows:

$$C = -\frac{1{,}000{,}000\,\Delta b}{b\Delta P} \qquad (1)$$

where

C = compressibility, bbl. space /p.s.i./million bbl.
b = volume factor, bbl. space/ bbl. oil
$\Delta b/b\Delta P$ = change in space/p.s.i./unit space.

The compressibility of undersaturated oil varies with pressure, tem-

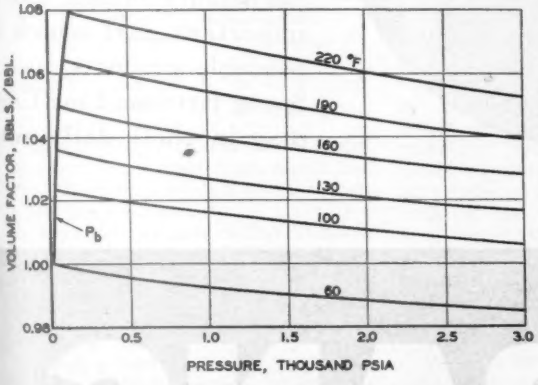

Fig. 15-1—Illustrating volume factors for a dead oil

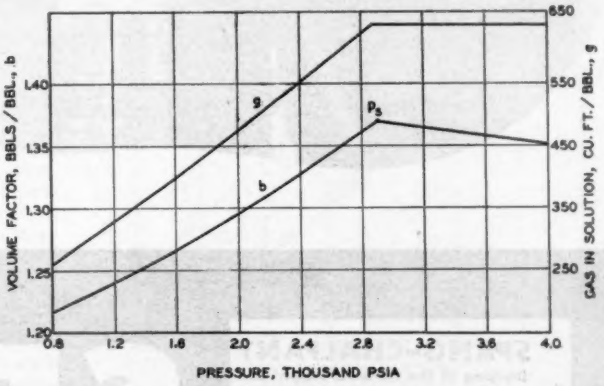

Fig. 15-3—Volume factor and gas in solution vs. reservoir pressure for a 28.7° A.P.I. oil at 160°F. Data by Sage and Lacy

*Production consultant, Houston.

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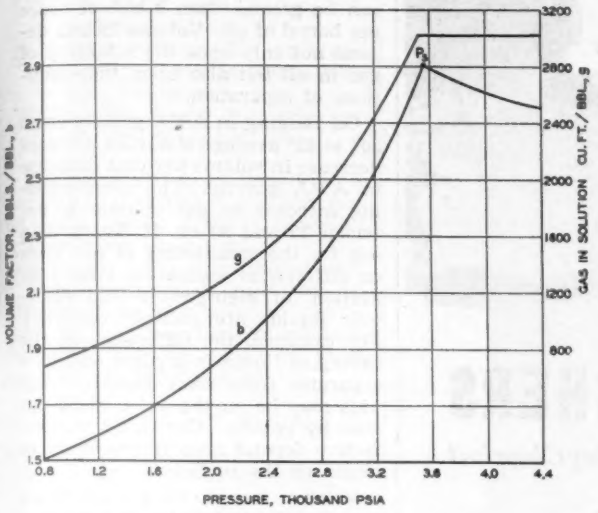

Fig. 15-4—Volume factor and gas in solution vs. reservoir pressure for a 46.1° A.P.I. oil at 190°F. Data by Sage and Lacey

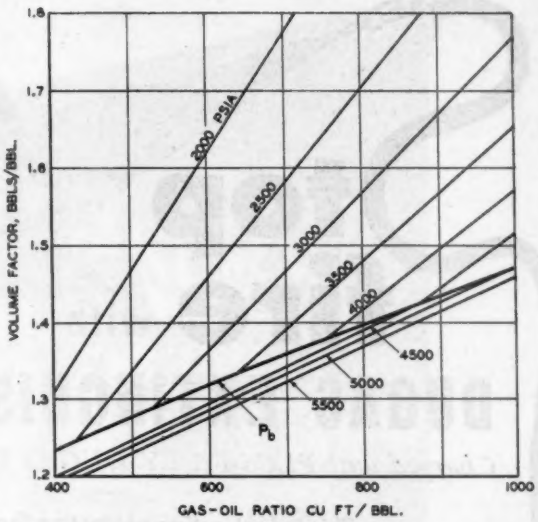

Fig. 15-5—Illustrating volume factor vs. gas-oil ratio at bubble-point pressure of an oil. Data by Sage and Lacey

perature, composition of oil, and with volume of gas in solution. The compressibility of the oil found in reservoirs may range anywhere from 5 bbl./p.s.i./million bbl. up to 100 bbl./p.s.i./million bbl. The minus sign in equation (1) means that oil expands with declining pressure. It also means that the volume factor for undersaturated oil increases with declining pressure.

Thermal Expansion of Oil

Fig. 15-2 illustrates thermal expansion for a dead oil at bubble-point pressure and at 3,000 p.s.i.a. The higher the temperature, the larger the volume factor. The slope per unit of space of the curves in this figure is called thermal expansion at a given pressure. For production purposes, thermal expansion is defined by

$$E = \frac{1{,}000{,}000\Delta b}{b\Delta T} \qquad (2)$$

where

E = thermal expansion, bbl. space/°F./million bbl.
b = volume factor, bbl. space/bbl. oil
$\Delta b/b\Delta T$ = change in space/°F./unit space

Thermal expansion of the oil found in reservoirs varies from about 500 bbl./°F./million bbl. up to more than 1,000 bbl./°F./million bbl. Other things equal, volume factors increase with reservoir temperature because of thermal expansion.

Volume Factors vs. Bubble-Point Pressure

When a barrel of oil is heated its volume factor increases. If, in addition, gas is forced into the oil under pressure, its volume factor increases still more. Figs. 15-3 and 15-4 are illustrative examples for a 26.7° A.P.I. oil at 160°F. and a 46.1° A.P.I. oil at 190°F. respectively. The curves (g) show the number of cubic feet of gas in solution per barrel of oil. The curves (b) show the corresponding volume factors at bubble-point pressure. If at some pressure such as P_s no additional gas is added but the pressure is increased, the volume factors decrease. The magnitude of this decrease depends upon the compressibility of the liquids under consideration.

In Fig. 15-3 the average compressibility is approximately 14 bbl./p.s.i./million bbl. In Fig. 15-4 the average compressibility is approximately 63 bbl./p.s.i./million bbl.

In producing from reservoirs, the foregoing process is reversed. For example, when a reservoir liquid is found at a pressure greater than its saturation pressure P_s, the liquid is said to be undersaturated. A decline in reservoir pressure down to saturation pressure is accompanied by expansion of liquid. A decline in reservoir pressure below saturation pressure causes some of the reservoir liquid to vaporize and form a reservoir gas.

Volume Factors vs. Gas Solubility

Volume factors vary with the solubility of gas in oil. Solubility of gas in oil depends upon the composition of oil and gas and reservoir temperature. In the example for the 26.7° A.P.I. oil, the average solubility between the saturation pressure and 800 p.s.i.a. is approximately 0.19 cu. ft. per p.s.i. per barrel of oil. In the example for the 46.1° A.P.I. oil, the average solubility between the saturation pressure and 800 p.s.i.a. is approximately 0.87 cu. ft. of gas per p.s.i. per barrel of oil. This is more than a fourfold variation in gas solubility.

Volume Factors vs. Gas-Oil Ratios

Other things equal, the volume factors for oil increase with gas-oil ratios. Fig. 15-5 is an illustrative example. The curves in this figure are for oil at bubble-point pressure. Volume factors for liquids in high-pres-

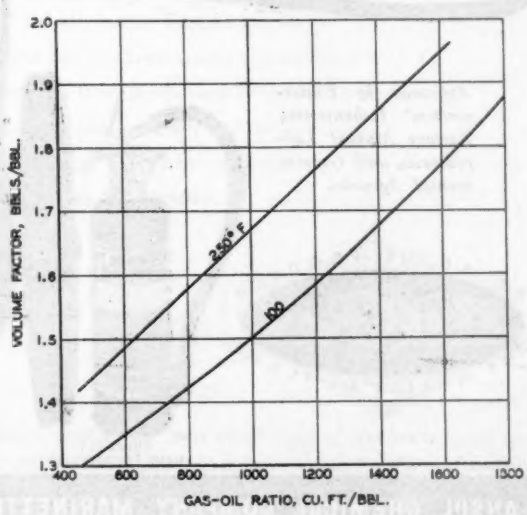

Fig. 15-6—Illustrating volume factor vs. gas-oil ratio and pressure for a 44° A.P.I. oil at 200°F. After Sage and Lacey

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sure, high-temperature reservoirs can be greater than 3 bbl. of space per barrel of oil. Volume factors depend not only upon the solubility of gas in oil but also upon the conditions of separation.

Oil ranging in A.P.I. gravity from 30° to 42° average about 2.5 per cent decrease in volume per unit decrease in A.P.I. gravity. The corresponding increase in gas volume is between 25 and 30 cu. ft. These data are for the weathering of oil. Data on differential separation, stage separation, of high-gas-oil-ratio reservoir liquids are entirely different. For example, the difference in the saving of liquid in a plant and in a separator from some reservoir liquids may be on the order of 50 per cent by volume. Obviously, volume factors depend upon the recovery of liquid on the surface.

Volume factors vs. gas-oil ratios can be illustrated by the method shown in Fig. 15-6. In this figure, the heavy line corresponds to bubble-point pressure. The lines below the bubble-point curve are for undersaturated oil. The lines above the bubble-point curve show volume factors for oil containing gas in solution plus some free gas not in solution. When a reservoir gas is associated with a reservoir liquid, volume factors are referred to as volume factors for mixtures or composite volume factors.

Composite Volume Factors

The composite volume factor for a reservoir liquid is defined by

$$J = b + B \qquad (3)$$

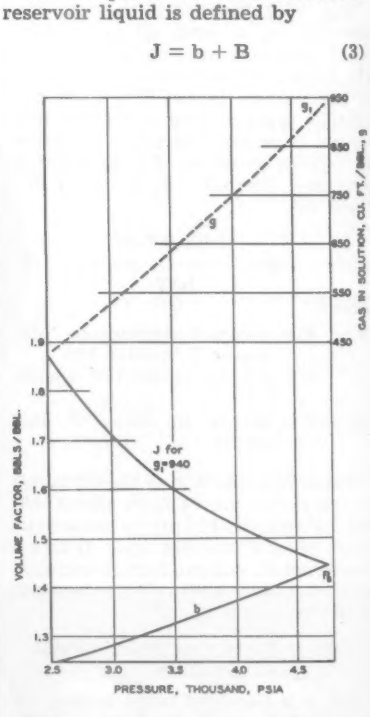

Fig. 15-7—Illustrating a calculated volume factor for a 40° A.P.I. oil at 210°F.

where

J = composite volume factor, bbl. space/bbl. oil

b = volume factor for reservoir liquid at bubble-point pressure, bbl./bbl.

B = volume factor for reservoir gas, bbl. space/bbl. oil.

The volume of gas originally in a barrel of oil is called solution gas-oil ratio. Now, if oil is produced with solution gas-oil ratio, the volume of reservoir gas associated with a reservoir liquid is equal to the difference between solution gas-oil ratio and volume of gas in solution. In such cases the value of B in equation (3) is defined by

$$B = 0.00504\,TZ/P\,(g_s - g) \qquad (4)$$

where

g_s = solution gas-oil ratio, cu. ft/bbl.

g = gas in solution, cu. ft./bbl.

T = absolute temperature, °R

Z = compressibility factor

P = pressure, p.s.i.a.

B = volume factor for gas phase, bbl. space/bbl. oil.

Fig. 15-7 illustrates a composite volume factor which was computed with the aid of equation (4). The solubility data, curve (g), and the bubble-point data, curve (b) are determined in a laboratory from experimental data on high-pressure separator gas, separator liquid, and tank oil. The composition of the reservoir gas evolving from solution is assumed to be the same as the composition of the high-pressure separator gas. Given the composition of the gas phase, the reservoir temperature, and the various reservoir pressures; the volume factor for the gas phase is computed by the method illustrated in the article on the volume factor for gases. (Part 13, January 27, 1945, page 263.) Composite volume factors are used in making volumetric balances for reservoirs.

As the volume of oil in reservoirs is inversely proportional to volume factors, it is advantageous to know them. Volume factors for oil are determined experimentally in a laboratory from either subsurface or separator samples. If these are not available, an estimate of volume factors may be made by the methods to be considered in the next article.

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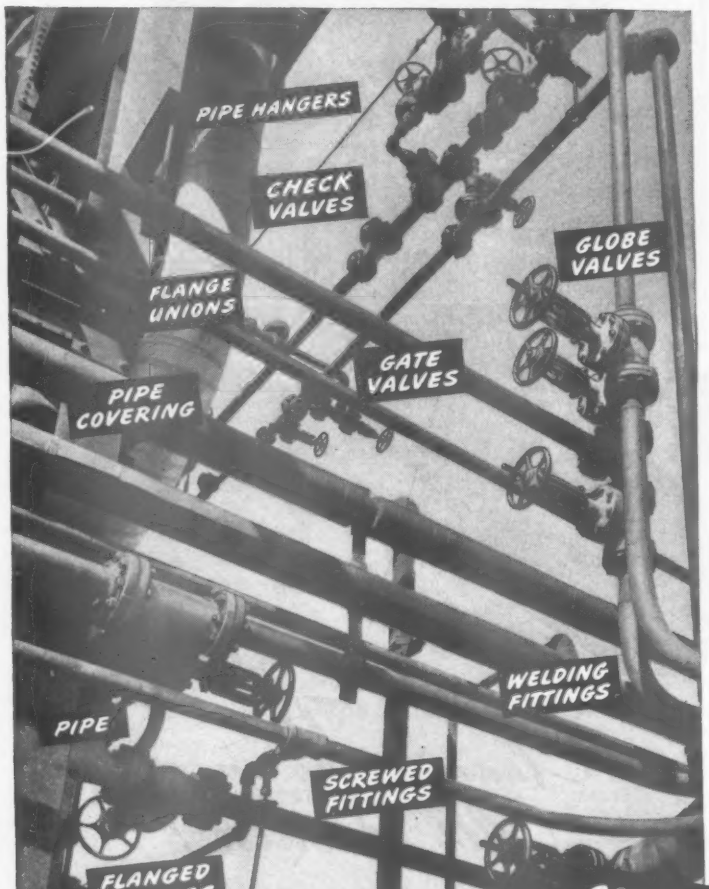

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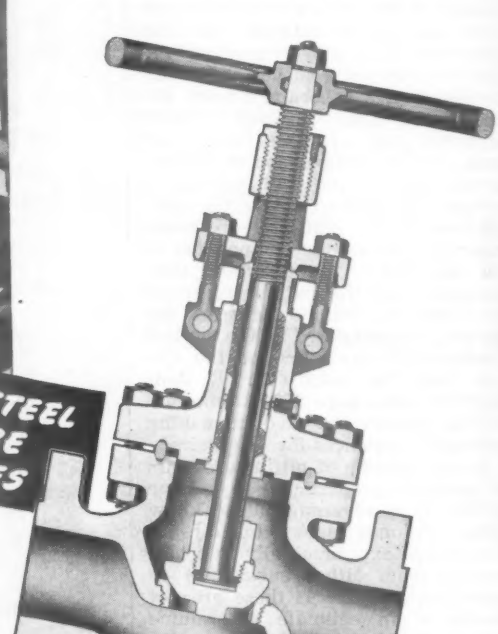

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Cracking of Latin American Crude Oils

*by Dr. Gustav Egloff**

8—Reforming Argentine Gasoline and Naphtha

ABSTRACT

Reforming straightrun and cracked naphthas from Argentine crudes results in octane numbers boosted up to about 70 A.S.T.M., with polymer gasoline yields up to about 5 per cent, and alkylate obtainable up to around 10 per cent from the butylenes formed. Pressures used ranged from 500 to 800 p.s.i., temperatures from 980° F. to 1,030° F. Sweetening in liquid phase gave better products than when the gasoline was sweetened in vapor phase. This is the final article in this series on Latin-American crudes.

INSTALLATION of facilities for reforming low-octane gasoline and naphthas is worthy of consideration by refiners, not only because of the improved octane number gasoline obtained, but on account of the production of increased quantities of propylene and butylene which can be converted to polymer gasoline, or used to alkylate isobutane and to yield high-octane number aviation gasoline. In the present study a gasoline and several naphthas produced in the refining of Argentine crude oils were investigated from this standpoint.

The properties of the gasoline and four naphthas which were reformed are given in Table 1. Stock No. 1 was a straightrun gasoline produced in 13 per cent yield in a semicommercial continuous distillation of a 28° A.P.I. gravity crude oil from the Comodoro Rivadavia field. Its A.S.T.M. octane number of 36 and its characterization factor of 12.05 indicate a paraffinic material. Stock No. 2 was produced in a commercial distillation of a crude oil from the same field, and stock No. 3 was produced in the cracking of a residuum. Stock No. 4 was a blend of four parts by volume of stock No. 2, and three parts by volume of stock No. 3. Stock No. 5 was a commercial mixture consisting of 52.8 per cent by volume of a straightrun naphtha and 47.2 per cent by volume of a cracked naphtha.

*Director of research, Universal Oil Products Co.

TABLE 1—PROPERTIES OF ARGENTINE GASOLINE AND NAPHTHA

Stock No.	1	2	3	4	5
Product—	Gasoline	Straight-run naphtha	Cracked naphtha	Blended naphtha	Blended naphtha
Gravity, °A.P.I.	58.8	54.4	47.9	51.5	46.1
Sulfur, %	0.04	0.03	0.14	0.07	0.05
Bromine No.	...	...	...	...	27
Acid heat, °F.	...	...	...	...	71
Characterization factor	12.05	11.9	11.7	11.85	11.66
Octane No., A.S.T.M.	36	38	48	40	51
100 ml. A.S.T.M. distillation:					
I.b.p., °F.	184	248	268	255	264
10%	225	265	309	279	299
50%	264	285	338	308	340
90%	309	327	366	360	389
E.b.p.	350	386	389	402	425
Distilled over, %	98.5	99.0	99.0	99.0	98.0
Bottoms, %	1.5	1.0	1.0	1.0	1.0
Loss, %	...	...	...	...	1.0

TABLE 2—REFORMING ARGENTINE GASOLINE AND NAPHTHAS; OPERATING CONDITIONS AND YIELDS

Stock No.	1	1	2	2	3	3	4	4	5
Run No.	1	2	1	2	1	2	1	2	...
Operating conditions:									
Temperature, °F.	985	1,020	1,020	1,030	1,020	1,020	1,020	1,025	980
Pressure, p.s.i.	770	775	750	750	500	500	600	600	750
Relative charging rate	1.38	1.26	1.64	1.20	1.68	1.36	1.56	1.02	1.51
Yields, vol. % of charge:									
Gasoline	85.6	69.5	87.7	74.6	83.2	80.4	82.8	75.3	73.3
Residuum	...	1.3	12.3	22.6	12.4	12.8	13.3	19.3	14.6
Gas, cu. ft./bbl. charge	420	832	441	720	449	441	436	616	416
Propylene, vol. %	...	10.8	...	( )	...	( )	( )	...	9.4
Isobutylene, vol. %	...	1.2	...	(18.9)	...	(15.1)	(21.7)	...	0.9
n-Butylene, vol. %	...	3.4	...	( )	...	( )	( )	...	3.8
Polymer gasoline, vol. % of charge or Propylene and butylene alkylate	...	5.3	...	5.8	...	2.8	4.0	...	2.4
	...	9.5	...	*6.2	...	*5.0	*4.4	...	4.4

*Butylene alkylate.

TABLE 3—REFORMING STRAIGHTRUN GASOLINE

Properties of Reformed Gasoline and Residuum

Stock No.	1	1
Run No.	1	2
Reformed gasoline:		
Gravity, °A.P.I.	59.2	58.0
Vapor pressure (Reid), p.s.i.	10.7	10.4
Octane No. A.S.T.M.	65	73
100 ml. A.S.T.M. distillation:		
I.b.p., °F.	104	92
10%	157	138
50%	254	237
90%	334	310
E.b.p.	399	376
Distilled over, %	96.0	97.0
Bottoms, %	1.0	1.0
Loss, %	3.0	2.0
Residuum:		
Gravity, °A.P.I.		12.7
100 ml. distillation:		
I.b.p., °F.		419
10%		518
50%		648
90%		...
E.b.p.		736
Distilled over, %		88.0
Coke, % by weight		12.0

Runs Made in Pilot Plant

The reforming runs on the five stocks were made in a pilot plant using once-through operation. The operating data and yields of gasoline, residuum, and gas are shown in Table 2, which includes analyses of the cracked gases in respect to propylene and butylenes, and calculated yields of polymer gasoline or alkylates producible from these olefins.

The straightrun gasoline constituting stock No. 1 was reformed under two sets of conditions involving substantially same pressure of 770-775 p.s.i. Run No. 1 employed a temperature of 985° F. and a charging rate of 1.38, while run No. 2 used a temperature of 1,020° F. and a reduced charging rate of 1.26, both changes

TABLE 4—REFORMING OF STRAIGHTRUN GASOLINE

Treatment of Blend of Cracked and Reformed Gasolines; Yields and Properties of Products

Treatment—	None	Sodium plumbite sweetened	Liquid phase clay	Vapor phase clay
Throughput:				
Bbl. of raw gasoline/ton of clay	...	...	500	500
Treating loss, % by vol. raw gasoline:				
Plant loss	...	...	1.5	2.5
Polymerization loss	...	...	3.0	2.7
Total loss	...	...	4.5	5.2
Properties of products:				
Gravity, °A.P.I.	58.5	58.6	59.6	60.6
Vapor pressure (Reid), p.s.i.	7.0	...	6.8	7.1
Sulfur, %	0.04	0.03	0.03	0.03
Color, °Saybolt	—5	—3	30+	26
Color stability*	...	...	22	22
Gum, mg./100 ml. (copper dish):				
Without inhibitor	214	179	5	36
With 0.025% No. 1 inhibitor	...	56	2	...
Oxygen bomb stability, induction period, min.:				
Without inhibitor	70	120	190	95
With 0.025% No. 1 inhibitor	...	245	775	345
Octane No. A.S.T.M.	68+	67	68	68
100 ml. A.S.T.M. distillation:				
I.b.p., °F.	101	105	107	99
10%	151	157	155	152
50%	245	248	243	235
90%	334	335	320	318
E.b.p.	393	391	371	360
Distilled over, %	97.5	98.0	98.0	97.5
Bottoms, %	1.0	1.0	1.0	1.0
Loss, %	1.5	1.0	1.0	1.5

*After exposure equivalent to 2 hours noon June sunlight.

TABLE 5—REFORMING STRAIGHTRUN AND CRACKED NAPHTHAS PROPERTIES OF PRODUCTS

Charging stock—	Straightrun naphtha		Cracked naphtha		Straightrun cracked naphtha blend	
Run No.	1	2	1	2	1	2
Untreated gasoline:						
Gravity, °A.P.I.	56.4	55.5	50.6	51.3	53.1	54.5
Vapor pressure (Reid), p.s.i.	11.9	11.1	9.2	12.1	8.9	10.9
Sulfur, %	...	...	...	0.07	...	0.03
Color, °Saybolt	...	...	...	Yellow	...	Yellow
Gum, mg./100 ml. (copper dish):						
Without inhibitor	...	...	...	282	...	87
With 0.025% No. 1 inhibitor	...	...	...	127	...	33
Oxygen bomb stability, induction period, min.:						
Without inhibitor	...	...	...	305	...	290
With 0.025% No. 1 inhibitor	...	...	...	360	...	335
Octane No. A.S.T.M.	65	71	63	65	66	69
100 ml. distillation:						
I.b.p., °F.	94	108	100	86	98	124
10%	172	152	178	166	176	147
50%	275	262	323	314	284	273
90%	354	334	371	372	360	352
E.b.p.	390	390	406	206	398	389
Distilled over, %	95.0	97.0	96.0	96.0	97.5	96.0
Bottoms, %	1.0	1.0	1.0	1.0	1.0	1.0
Loss, %	4.0	2.0	3.0	3.0	1.5	3.0
Residuum:						
Gravity, °A.P.I.	...	23.5	21.0	18.5	21.0	11.7
100 ml. distillation:						
I.b.p., °F.	..	260	300	370	264	420
10%	...	334	397	402	303	478
50%	...	506	484	504	402	578
90%	...	701	714	696	672	...
E.b.p.	...	703	714	370	688	376
Distilled over, %	...	96.0	95.0	94.0	96.0	88.0
Distilled at 400° F., %	...	19.5	12.0	9.5	49.5	...
Distilled at 572° F., %	...	66.7	67.0	64.5	78.5	48.0
Coke, % by wt.	...	4.0	5.4	6.0	4.0	12.0
Gas composition, % by volume:						
Ethylene	...	5.1	...	8.3	5.8	5.2
Propylene and butylenes	...	18.9	...	15.1	21.7	...

serving to increase the extent of reforming. The properties of reformed gasolines from the two runs on this stock are given in Table 3, which also includes the gravity and distillation data on the residuum from run No. 2. The more severe operating condition produced a 73 A.S.T.M. octane number gasoline in 69.5 per cent yield, and the polymer gasoline producible from the propylene and isobutylenes in the gas was calculated to be 5.3 per cent by volume of the charge, based on commercial experience. Alternatively, 9.5 per cent by volume of the original gasoline can be obtained as alkylate. The polymer gasoline has an octane rating of about 82, and that of the alkylate will vary between 91 and 93.

A mixture of the reformed gasoline and a gasoline produced by cracking a straightrun residuum was sweetened with sodium plumbite and treated separately with clay, both under liquid phase and under vapor-phase conditions. The data on these treatments and a comparison of the properties of the untreated and treated gasolines are given in Table 4. In commercial practice, one may expect 5 to 10 times more throughput of gasoline per ton of clay than that obtained in the laboratory tests. Simple sweetening of the cracked and reformed gasoline mixture did not greatly improve the inhibitor susceptibility as indicated by the gum content of 56 mg. in the sweetened gasoline after the addition of 0.025 per cent of No. 1 inhibitor, although this addition increased the induction period to a satisfactory point. Under the conditions of clay-treating employed, either type of treatment produced a satisfactory gasoline, although the gum content and induction period were considerably better in the gasoline treated in liquid phase.

Operation Conditions and Yields

Stocks 2, 3 and 4 were separately reformed under varying conditions of operation to ascertain the improvements in octane number which could be obtained. The operating conditions and yields of products are shown in Table 2, and the properties of the reformed gasolines, residua and gas are given in Table 5. In both runs on the straightrun naphtha a pressure of 750 p.s.i. was used while the temperature was raised from 1,020° F. in run No. 1 to 1,030° F. in run No. 2, and the charging rate was reduced from 1.64 to 1.20. Run No. 1 gave a 65 A.S.T.M. octane number gasoline, and the product from run No. 2 showed a value of 71. The calculated polymer gasoline yield from the second run was 5.8, and the potential yield of butylene alkylate would be 6.2 volume per cent based on the charge.

The cracked naphtha comprising stock No. 3 was reformed in two

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TABLE 6—REFORMING STRAIGHTRUN AND CRACKED NAPHTHA BLEND PROPERTIES OF GASOLINE RESIDUUM

Untreated gasoline:	
Gravity, °A.P.I.	51.4
Vapor pressure (Reid), p.s.i.	9.6
Sulfur, %	0.04
Octane No. A.S.T.M.	70
100 ml. A.S.T.M. distillation:	
I.b.p., °F.	97
10%	167
50%	297
90%	362
E.b.p.	387
Distilled over, %	97.0
Bottoms, %	1.0
Loss, %	2.0
Residuum:	
Gravity, °A.P.I.	23.8
100 ml. distillation:	
I.b.p., °F.	387
10%	409
50%	446
90%	685
E.b.p.	714
Distilled over, %	97.0
Coke, % by wt.	2.8

runs under the same temperature and pressure conditions of 1,020° F. and 500 p.s.i., but under a charging rate of 1.68 in the first run and 1.36 in the second run. The small decrease in the charging rate raised the octane number of the reformed gasoline from 63 to 65. Polymer gasoline available from the olefins was calculated to be 2.8 per cent by volume of the charge, and the butylene alkylate was estimated to be obtainable in 5 per cent yield by volume.

Reformed in Two Runs

Stock No. 4 consisting of a blend of straightrun stock No. 2, and cracked stock No. 3 was reformed in two runs at 600 p.s.i. In the first run a temperature of 1,020° F. and a charging rate of 1.56 were employed, while the temperature was raised to 1,025° F. and the charging rate reduced to 1.02 in the second run. The more severe treatment given by the second set of conditions increased the octane rating from 66 to 69. The calculated polymer gasoline from the first run was 4 per cent by volume of charge, and the butylene alkylate 4.4 per cent. The results of cracking the blend of straightrun and cracked naphtha were substantially intermediate to those obtained in the separate cracking of the blend components.

One run was made on stock No. 5 representing a commercial blend of straightrun and cracked naphthas. Using a moderate temperature of 980° F., a pressure of 750 p.s.i., and a relative charging rate of 1.51, a 73.3 per cent yield of 70-octane number gasoline was produced. The properties of the gasoline and residuum from this reforming operation are summarized in Table 6. The calculations indicate that the propylene and butylenes in the gases can be converted into 2.4 volume per cent of polymer gasoline, or that 4.4 volume per cent of mixed propylene-butylene alkylate can be made available based on the charge.

The reformed gasoline was separately sweetened and refined with clay in vapor phase, and the results and the properties of the treated gasolines compared with the untreated charge are given in Table 7. Sweetening alone gave a product of fair inhibitor susceptibility, and the vapor-phase clay treatment gave a product which required no inhibitor since its copper-dish content was only 2 mg. and its induction period 570 minutes.

TABLE 7—REFORMING STRAIGHTRUN AND CRACKED NAPHTHA BLEND TREATMENT OF REFORMED GASOLINE TREATING CONDITIONS, YIELDS AND PROPERTIES OF PRODUCT

Treatment—	None	Sweetened	Vapor phase clay
Treating loss, % by vol.:			
Polymerization loss	...	...	1.0
Distillation loss	...	...	1.0
Total loss	...	...	2.0
Properties of product:			
Gravity, °A.P.I.	53.0	52.3	51.3
Vapor pressure (Reid), p.s.i.	9.9	7.9	4.8
Sulfur, %	0.04	...	0.03
Color, °Saybolt	—8	—7	28
Color stability*	...	...	25
Gum, mg./100 ml. (Copper dish):			
Without inhibitor	303	335	2
With 0.025% Inhibitor No. 1	...	59	1
Oxygen bomb induction period, min:			
Without inhibitor	175	135	570
With 0.025% inhibitor No. 1	...	220	900
Octane No. (A.S.T.M.)	70	69.5	70
100 ml. A.S.T.M. distillation:			
I.b.p., °F.	108	110	127
10%	175	183	194
50%	293	291	292
90%	359	358	357
E.b.p.	382	382	387

*After exposure equivalent to 2 hours noon June sunlight.

Gulf Coast Innovations In Gravel-Packing

(Continued from page 97)

the well practically ceased flowing.

Tubing was pulled and the screened perforations were found to be completely plugged by an extremely fine sand.

Since the well's production, even at its maximum rate, was not great enough to withstand the expense of the frequent pulling jobs which would be necessary, it was decided to move in tools and gravel pack. A special milling tool which has proved quite satisfactory along the coast in cutting out sections of casing was used to cut out the pipe from 2,796 ft. down to 2,842 ft. The underreaming operation was then begun to increase the hole diameter of this 46-ft. section to approximately 16 in. Since the success of a gravel pack is largely dependent upon the thickness of the pack itself, T. J. Slavik, production manager for G. W. Strake, instructed that a caliper log be taken at three different times during the underreaming operation. The progress of the underreaming until the hole had been brought to an average diameter of 16 in. as shown in Fig. 2.

The next operation involved running the screen assembly on the drill pipe. The hole was then circulated to insure the removal of all sand and cuttings.

Three sizes of gravel were used in packing this well. The coarsest size was 0.125 in. in diameter; the intermediate size, 0.090 in. in diameter; and a fine size gravel, 0.060 in. in diameter. The largest size was pumped down the annulus first, the intermediate size next, and the small gravel placed on top. The procedure of placing the pack is essentially the same as that followed when this method was introduced. A diagrammatic sketch of the well after the placement of gravel is shown in Fig. 3.

It has been found that the method of placing a newly gravel-packed well back on production is extremely important if satisfactory results are to be obtained. Several wells along the Gulf Coast, in which highly successful production results were obtained for months after the gravel-packing operation, have gone dead suddenly. It has been fairly well established that in these sudden opening was responsible for the plugging of the gravel pack.

When a gravel pack job has been completed the well should be choked as much as possible when placing back on production. By watching the sand grindout, the choke can be gradually increased until the well is producing the desired production.

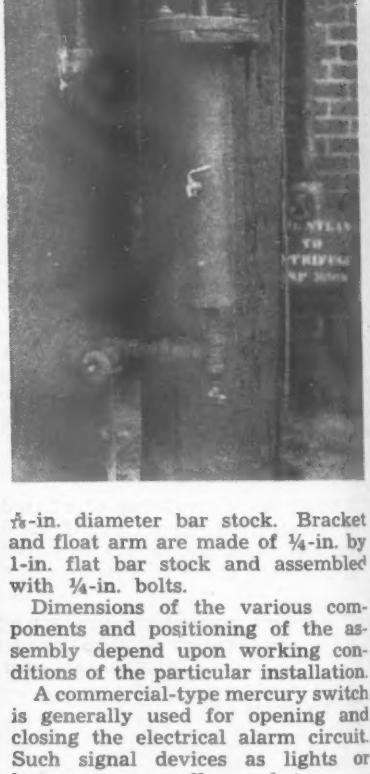
Float Switch for High-Level Tank Alarm System

MISCELLANEOUS discarded items usually obtained around the plant may be made into a float and switch assembly for a liquid-level alarm system. The photograph illustrates the method of assembling the unit.

The body, one of three main parts, is made of 3-in. standard pipe, having one of its ends threaded. Rough surfaces on the inside of the pipe are removed to avoid interference with the float.

A circular steel plate, having a ¾-in. pipe coupling welded to it, is attached to the plain end of the 3-in. pipe by fillet welding. A standard 3-in. pipe flange with bolts and cover plate is attached to the opposite end; ¾-in. tap is made in the cover plate.

Light-gage sheet metal is used to make the float which is soldered for tightness. At one end is an attachment for the float rod which is of



⅜-in. diameter bar stock. Bracket and float arm are made of ¼-in. by 1-in. flat bar stock and assembled with ¼-in. bolts.

Dimensions of the various components and positioning of the assembly depend upon working conditions of the particular installation.

A commercial-type mercury switch is generally used for opening and closing the electrical alarm circuit. Such signal devices as lights or horns are normally used to warn the operator that a certain level in the tank to which the float is attached has been reached.

Alva M. Johnson, who was exploitation engineer for Shell Oil Co., Inc., at Long Beach, Calif., has been promoted to division exploitation engineer in the Los Angeles basin division.

W. J. Larson, of Union Oil Co. of California, has been appointed manager of field operations, with headquarters in the Los Angeles office. He succeeds **R. D. Gibbs,** recently advanced to assistant to the executive vice president.

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QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Comparison of Solvent Treating Processes

What do you think of phenol solvent treating? Our paraffinic oils now have to be treated so vigorously with sulfuric acid in order to meet competition that we must do something.—A.B.R.

The cost of improving the color of lubricating-oil stocks is undoubtedly less by solvent-treating methods than by conventional acid treating and clay contacting. This arises in part by direct improvement in color, but also by the generally smaller losses of oil. When making drastic improvements in viscosity index, the loss by solvent-treating processes is also large but in such a case the large loss is compensated for by the improved properties and value of the finished oil.

The improvement in the properties of an oil gained by solvent refining is somewhat dependent on the properties of the original stock as well as the type or kind of solvent employed and hence each refiner must satisfy himself by laboratory tests as to the most suitable solvent. Undoubtedly the selection of a solvent at this stage of consideration is dependent on the particular kinds of improvement desired by the refiner as oxidation resistance, viscosity index, neutralization number, carbon residue, etc., and most technical authorities agree that we know very little about the practical or road-performance value of the properties (or routine tests) just enumerated. Thus, it is quite probable that two refiners with exactly the same laboratory data in front of them would each select a different solvent.

Having settled upon a solvent that will produce an oil of properties suitable to the refiner, he then might wish to revise or alter his selection because of plant difficulties or costs involved in the use of some of the solvents. The only way to make such a comparison is the construction and operation of pilot-plant equipment, and such an expenditure is well worth while because of the direct experience and knowledge gained about the behavior of the proposed plant. Such knowledge cannot be gained entirely by discussions with other operators even though they are successfully operating their solvent plants.

Data Not Complete

The complexity of various solvent plants and their operation can be gaged in some degree by the cost of plants and the cost of operating them. However, data to be found in the published literature are not at all complete and their presentation here is approached with some doubt because they may be misleading. Bearing this in mind, tabulation of costs is presented in Table 1.

Most complete data are those for furfural and for chlorex. It is regrettable that contracting companies or licensing agencies have not made more data available on the other processes. Plant-construction costs do not seem to differ greatly. This might be expected because in any type of plant the main operations are ones of distilling and recovering the solvent from the oil, and hence differences in the costs of applying and separating the solvent solutions will not alter the total cost greatly.

TABLE 1

APPROXIMATE COSTS OF SOLVENT-TREATING OPERATIONS

Process—	Operation cts./bbl.	Cons. $ per d'ly bbl.	Capacity B.P.D.
Chlorex	27-33	101-208	2400-600
Chlorex (batch)*	17-56	27-180*	1000-500
Furfural	9-20	70-300	5000-500
Nitrobenzene	23-42	186	1200
Phenol	17	.....	.....
Propane Deasph. & Deresining	30-40	.....	1000

*In somewhat makeshift equipment such as batch stills for the rerunning of the solvent solutions, and the cost of the distillation equipment is not included in the construction cost.

Increase in Viscosity Index

Consideration of the properties of the finished oils is nearly precluded by the numerous methods of comparison, by the many degrees of completeness of the treating, and by possible argument over the significance of the properties, but the matter of oil loss can be compared with fair accuracy. Fig. 1 indicates approximate increases in viscosity index for a 1 per cent loss. Note that the vertical scale changes at a value of 2, so that exceedingly high values can be shown. Some of the inconsistency may be due to the fact that some of the oils were dewaxed and others were not. Dewaxing often reduces the viscosity index by 6 to 15 units. Obviously, the larger the increase in viscosity index per 1 per cent loss the better the process. It appears that Duo Sol and SO_2-benzol are superior in this respect, but the data are most consistent for furfural (and the line on the figure indicates the behavior of furfural). Most of the data are of a laboratory nature and hence actual plant operations may show an entirely different effectiveness of the various solvents. Propane treating does not improve the viscosity index much except for highly naphthenic stocks.

An idea of the losses (material of low viscosity index) involved by solvent treating may be gained from the following tabulation based on average conditions:

V.I. of Charge-stock	Assumed ΔV.I./% Loss	V.I. of Product	Per cent Loss
—90	2.8	50	48
—90	2.8	90	64
0	1.8	80	45
0	1.8	100	56
30	1.55	100	45
50	1.4	100	36
70	1.3	100	23
85	1.1	100	14
85	1.1	105	18
100	0.8	110	12

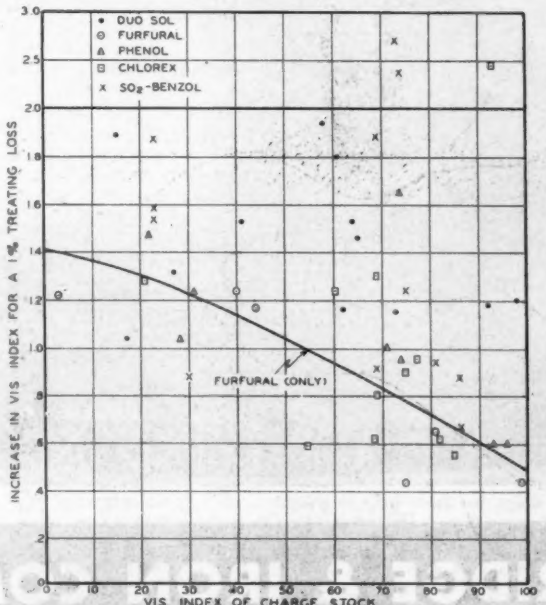


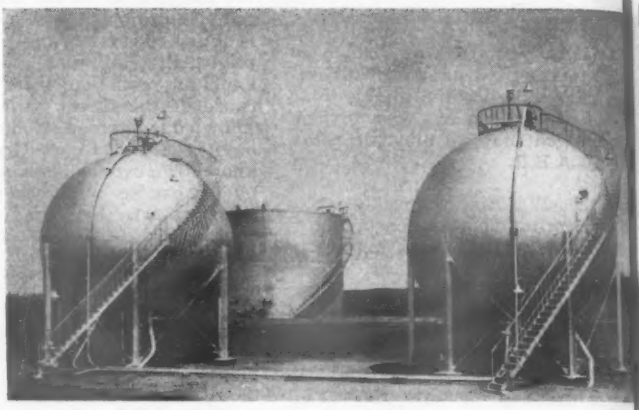
Fig. 1

VAPOR-SAVING EQUIPMENT

Nation's Aviation

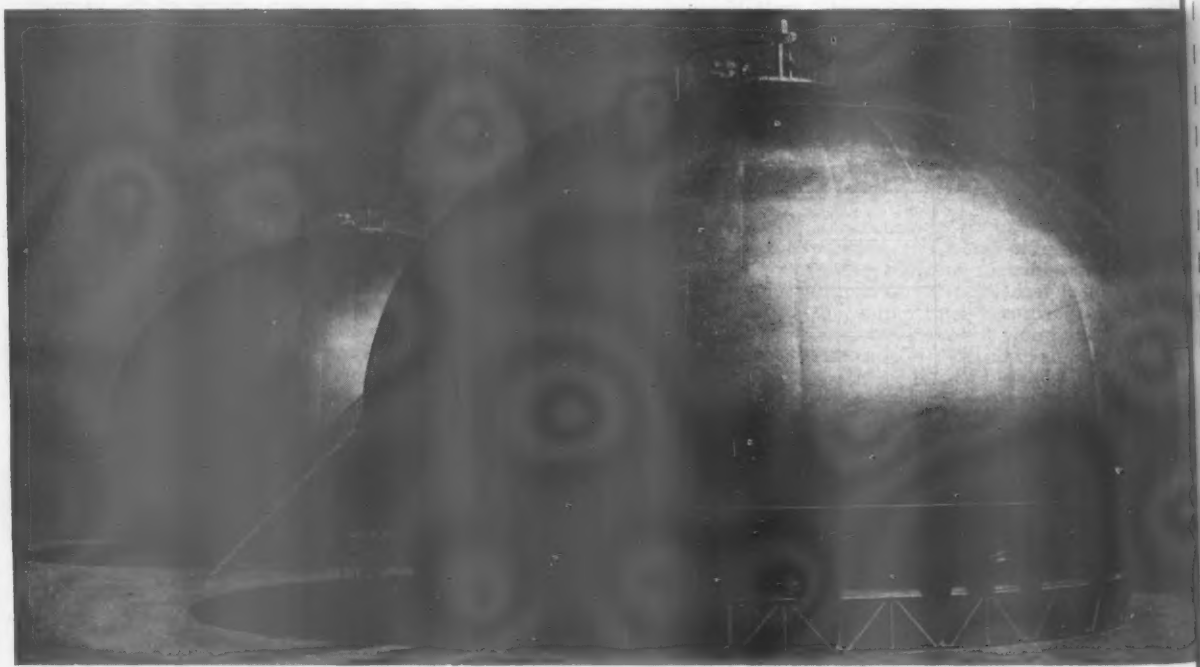
Here is a partial list of the vapor-saving equipment and storage tanks that we have furnished to the oil industry:

HORTONSPHERES
HORTONSPHEROIDS
HEMISPHEROIDS
WIGGINS BALLOON ROOFS
WIGGINS PISTON BALLOON
WIGGINS PONTOON ROOFS
WIGGINS BREATHER ROOFS



The above photo shows two Hortonspheres located at a refinery at El Segundo, California. They are used to store 28-lb. natural gasoline. Each sphere holds 2,500 bbls. and has an operating pressure of 50 lbs. per sq. in.

Shown below are two 30,000-bbl. Hortonspheroids which operate at 15 lbs. per sq. in. pressure. They are located at a well known aviation gasoline plant.



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Engineering Fundamentals

No. 172

A FEATURE OF THE OIL AND GAS JOURNAL

Identification of Oil-Field Waters by Means of pH Determination

THE pH factor is a convenient measure of the intensity of the acidity or alkalinity of a solution or liquid. For example, the number of hydrogen ions (H) in 0.1 normal hydrochloric acid is 60 times the number of hydrogen ions in 0.1 normal acetic acid. Hydrochloric acid is thought of, therefore, as a strong acid, and acetic acid as a weak acid. Correspondingly, pH is an intensity factor which measures the strength of an acid or base. Arbitrarily, the pH scale is made to run from 0 to 14. A pH of zero is 100 per cent ionization of a normal acid, and a pH of 14 is 100 per cent ionization of a normal alkali. Hence, half-way between zero and 14, or a pH of 7, is neutral. Any pH value larger than 7 denotes an alkaline solution, and any pH smaller than 7 denotes an acid solution. The smaller the pH value below 7, the more intense is the acid reaction. The larger the pH above 7, the more intense is the alkalinity.

Determination of pH.—Commonly pH measurements are determined with a pH meter. The principle of the instrument depends upon the fact that any salt solution placed in series with a calomel half cell and a glass electrode will produce a minute electromotive force. The voltage produced varies according to the concentration of hydrogen ions in the solution and can be read directly by means of a sensitive galvanometer on the instrument, and the corresponding pH calculated. In practice with a modern pH meter, the cell voltage is amplified many thousand times by an electronic circuit similar to amplifying circuits used in radios; the resulting voltage may then be read by means of a small and rugged galvanometer built into the instrument and so calibrated that it may be read directly in pH units. The whole instrument is built into a case which may be taken into the field. The box is opened, one electrode is immersed in a solution of standard calomel having a pH of 6.5 and the other in a small beaker containing the oil-field water*, and the two receptacles are connected through a salt bridge. The switch of the instrument is then turned on, and the pH measurement read on the dial—a very simple operation. Since the acid or alkalinity of oil-field waters varies in different wells and in different horizons in the same well, those pH determinations furnish characteristics of the water which are sometimes as definite as the salinity and total solid content and have the advantage of being extremely easy to determine. The following table shows the pH determinations of typical oil-field waters.

*In the Beckman instrument both electrodes are placed in the oil-field water.

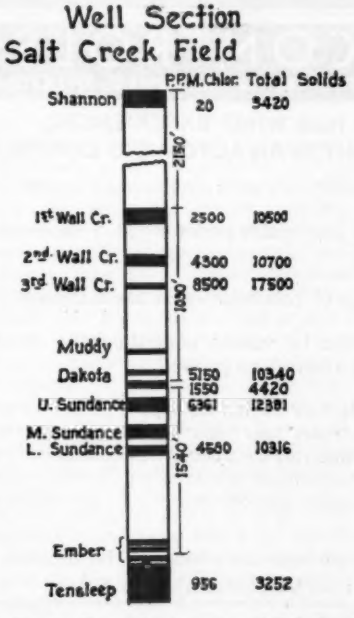

Fig. 1—Generalized section of Salt Creek oil field showing location of oil sands, concentration of chlorides, and concentration of total dissolved solids found in each sand. Data from Ross and Swedenborg. Analyses of water Salt Creek field: A.I.M.E. Tech. Pub. 157, 1928

pH OF UNDERGROUND WATERS IN TEXAS

Well location and sand—	pH
(1) East Texas, Woodbine	7.21
(2) Gladewater, Woodbine	7.11
(3) East Texas, Woodbine	7.0
(4) Temple, "Trinity"	8.0
(5) Luling, Edwards lime	6.79
(6) San Saba County, Ellenburger lime	8.2

In general, shallow water, especially in regions of alkaline soils, are alkaline and have high pH values. Deep waters, especially those associated with oil sands, have lower pH values and may be acid in reaction. However, it should be noted that differences in the pH of waters are in many cases marked only by differences in the decimal place on the pH scale. Therefore, extreme care has to be exercised in making the determinations to avoid all errors; especially, should all readings be made at the same temperatures or as nearly the same temperature as possible. Change in temperature may affect the pH readings. Most of all, care must be exercised in cleaning the electrodes after each reading. In making pH readings, select water free from oil if possible. If oil gets on the electrode, dip the electrode in carbon tetrachloride to remove oil and wash carefully with distilled water several times. A microscopic film of oil on an electrode will change the conductivity and hence the pH several decimal points.

Acid waters having a pH of less than seven are generally much more corrosive to iron and steel than alkaline waters. Hence, pH determinations are not only useful as an aid in identifying oil-field waters, but also in determining certain chemical characteristics of water without rsort to tedious chemical analyses. In fact, according to Rogers†, pH values may be used to estimate the amount of CO_2 in water by applying a simple equation.

†Rogers, W. F., Equipment Corrosion in High-Pressure Wells: Oil Weekly, pp. 37-38, May 29, 1944.

Series prepared by F. B. Plummer, professor, petroleum engineering school, University of Texas

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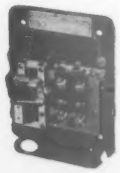

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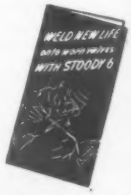

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The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Laboratory Salt Control

ALTHOUGH all of the salt in crude oil is not deposited as a solid in the topping-plant equipment nor is it converted totally into hydrochloric acid, it causes serious difficulties in operation. Were the salt totally deposited, or if all of it corroded the steel to form ferrous chloride, the effects in a 10,000-bbl.-per-day topping plant would be:

Salt content, lb./1,000 bbl.	Salt deposits*, Tons/day	Salt deposits*, Cu. ft./day	Corrosion, lb. steel/day
1,000	5.0	29.0	4,760
100	0.5	3.0	476
20	0.1	0.6	93

*Pure salt that contains no carbon or other debris.

Short-cut methods of determination such as by the specific gravity or the conductivity of the brine are scarcely less tedious than volumetric quantitative methods and are not extensively used. In addition, crude settlers are frequently erratic in their performance and many refiners change oils from day to day. Many crude oils can be handled by Method 1 but Method 2 is probably more accurate, is scarcely more complicated, and can be used on all oils except a few which form stable emulsions. The standardization of solutions should whenever possible be made in the presence of the crude oil just as when making a regular determination on oil. Finally, determinations of the calcium and magnesium chlorides are sometimes useful but the procedure is too long for this page. (See U.O.P. Method A-22-40 Procedure D, Laboratory Test Methods, Universal Oil Products Co., Chicago.)

Method 1

Brines and most crude oils.—To 200 ml. of crude oil are added, in order, 30 ml. alcohol, 30 ml. acetone, 50 ml. benzene, and 200 ml. hot distilled water. Shake after each addition, and for 15-20 minutes after adding the water. Additional benzene may be required to break emulsions. Draw off the water layer and if necessary adjust its pH to barely acid to phenolphthalein. To exactly a 50 ml. aliquot of the aqueous layer (approximately 65 ml. because of alcohol and acetone) add 3 ml. of potassium chromate (5 per cent) indicator and titrate with 0.0488 N. silver nitrate (unless the oil is very lean or very rich in salt). Stir well at end point to note the first brown tinge.

$$20 \times \text{ml. } 0.0488 \text{ N. } AgNO_3 = \text{lb. NaCl per 1,000 bbl.}$$

Brine can be titrated directly. Repeated extractions and a correction for the solubility of silver chromate are suggested by Universal Oil Products Co.

Method 2

For crudes in which sulfur compounds interfere by producing a dark color when silver nitrate is added (similar to Procedure B of the U.O.P. Method A-22-40)—to 100 ml. of crude oil in a 500 ml. separatory funnel add 100 ml. of benzene, followed by 25 ml. acetone (swirl to break emulsion) and by 100 ml. of very hot water. Shake thoroughly for 5 minutes and before air bubbles can escape add and gently mix 25 ml. more acetone into the mixture. Settle and withdraw the water layer. Two or perhaps three such extractions are made. Combine and evaporate all extracts to 75-100 ml. Add one-fourth of this volume of concentrated nitric acid and boil 5-10 minutes. Cool the solution and add an excess of standard silver nitrate, heat barely to boiling and after allowing the precipitate to coagulate, filter the solution. Add 5 ml. ferric alum indicator (saturated solution) and back titrate the excess silver nitrate with 0.05-0.1 N. ammonium thiocyanate to the first pink color.

$$(\text{Ml. } AgNO_3 \times \text{its normality less ml. } NH_4SCN \times \text{its normality}) \times 204.9 = \text{lb. NaCl per 1,000 bbl.}$$

Emulsions. — The addition of about half a gram of sodium soap in the above analysis has been used by some to assist in breaking emulsions. Oils which form exceedingly stable emulsions can usually be handled by the use of small amounts of phenol such as Procedure C of U.O.P. Laboratory Test Methods.

Some crude-oil emulsions cannot be easily broken or resolved and in such a situation, the following references may contain useful hints:

1—Davis, Jones and Nelson: Refiner and Natural Gasoline Manufacturer, page 271, June 1938.

2—Hawthorne and Bedell: Eighth Midyear Meeting, A.P.I., Wichita, May 24, 1938.

3—Roberts, Stenzel, and Eberz: Petroleum Engineer, page 42, March 1939.

TENTATIVE SCHEDULE

The Refiner's Notebook has now treated the following general topics:

Storage — July 22 to November 18, 1944.

Crude Oils—September 16 to December 2, 1944.

Topics on the analysis of crude oil are now being discussed:

No. 24—Crude Distillation.
No. 26—Evaluation Curves.
No. 29—Salt Control.
No. 31—Yields.
No. 32—Corrosion Control.
No. 36—Sulfur Analysis.

The schedule of topics now appearing is:

No. 26—Evaluation Curves.
No. 27—Cost of Topping.
No. 28—Processing Asphaltic Crudes.
No. 29—Laboratory Salt Control.
No. 30—Crude-Oil Settlers.
No. 31—Yields From Crude.
No. 32 — Laboratory Corrosion Control.
No. 33—Manufacture of Solvents.
No. 34—Flash Vaporization.

No. 29 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

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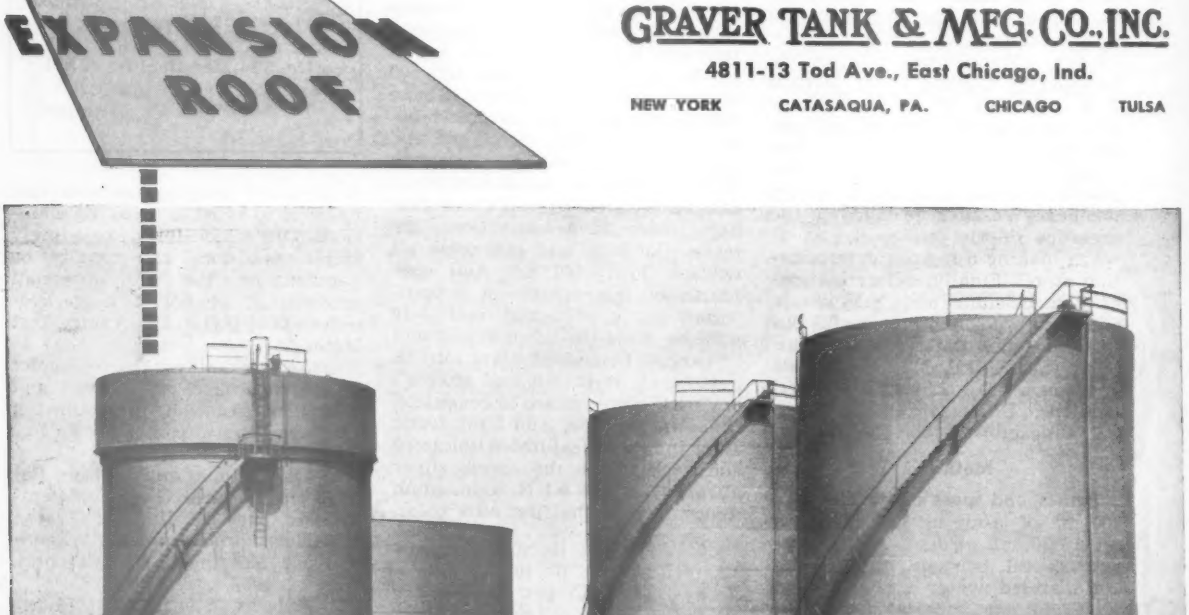

Natural Gas

Bill Would Increase Tax On Texas Natural Gas

AUSTIN.—A bill introduced in the legislature by Rep. Pat Wiseman, of Jacksonville, would effect a substantial increase in the tax on natural gas in Texas. The measure would impose a levy of 1 cent on each 1,000 cu. ft. of gas gathered by pipe lines, and 1 cent production tax on each 1,000 cu. ft. of sweet gas, ½ cent on each 1,000 cu. ft. of sour gas and ½ cent on each 1,000 cu. ft. of casinghead gas produced with oil.

Liquids extracted from gas would pay ¼ cent a gallon tax if obtained by nonchemical processes and ⅛ cent if extracted mechanically. The tax would replace the present gas tax of 5.2 per cent of market value at the well. The price averages between 3 and 4 cents a 1,000 cu. ft. and the present tax yields slightly more than $3,000,000 annually.

There is likelihood of a determined fight at this session of the legislature for an export tax on both natural gas and crude oil.

With the expansion of its synthetic-rubber and aviation-gasoline industries Texas is alarmed lest excessive exportation of its natural resources might result in loss of these industries, which are expected to spearhead the state's industrial expansion after the war.

Texas also expects that its natural-gas reserves will serve as foundation for a great postwar chemical industry.

The looked-for tax measure is expected to be based on conservation, since its proponents believe it will have a better chance of passage as such. Some doubt has been expressed that either commodity can be taxed for export without also taxing both oil and gas processed and consumed in the state.

Want Assurance Mexico Is Utilizing Its Own Gas

WASHINGTON. — Members of Federal Power Commission, considering an application of Reynosa Pipe Line Co., of Corpus Christi, Tex., for authority to transport natural gas from Texas into Mexico, said they would like to be assured that Mexico has fully utilized its own resources. Reynosa wants to build a 30-mile pipe line from La Blanca gas field, north of McAllen, Tex., to Reynosa, Mexico. The line would be extended by a Mexican corporation, Gas Industrial, for industrial uses.

R. G. Sada, representing Monterrey glass manufacturers, told of the inability of Monterrey industries to get more gas than is now supplied by a pipe line extending from the border at Roma, Tex. The line carries 28,000,000 cu. ft. daily, with about 2,000,000 cu. ft. obtained in Mexican-owned fields 10 miles south of Roma and the remainder supplied by United Gas Pipe Line Co. from Texas fields.

Sada said geologists had found pressure too low in Mexican fields south of Roma and reserves inadequate to augment the supply going to Monterrey.

Commissioner John R. Scott expressed a desire to have more data showing that this source could not be further developed. He asked why pumps could not be employed to move additional gas. He added it was his desire to know if it is consistent with the public interest to permit the export of American gas to Mexico.

Virgilio Garza, counsel for Gas Industrial, testified that all gas and oil in Mexico belongs to the government except that in areas where concessions had been granted prior to 1917. Only a change in Mexican laws, he said, would permit exploration and development by private enterprise.

Members of the Texas Railroad Commission sat with the Federal Power Commission in an advisory capacity in the hearing.

War Needs Force Curb on Other Natural-Gas Uses

WASHINGTON.—Declaring a critical situation has developed as a result of extraordinary drains upon the natural-gas supplies, Edward Falck, director of the War Production Board Office of War Utilities, has issued an appeal to all consumers throughout the Appalachian area to cooperate in order to avert a breakdown of distribution facilities.

The continuing cold weather has precipitated a crisis, says Falck, affecting the operation of many war-production plants using natural gas. Pipe lines are pooling their resources to maintain this vital supply.

The enormous increase in the use of natural gas as a fuel in war production as well as the every-day use of gas is accentuated by freezing temperatures with their drain upon reserves. The shortage of other fuels, such as coal and oil, has caused many to use gas in their homes to an unprecedented degree.

If the pressures on main systems to to be maintained, relief must be had by reducing consumption promptly, as otherwise pressures will fail to the point where no gas is available to anyone, Falck warns.

Local utilities in all the areas affected have been directed to appeal to their consumers.

Gas-Compressor Plant to Be Built at Elk Hills

WASHINGTON. — War Urgency Committee, recognizing the importance of Elk Hills as a contributor to the war effort, has approved construction by Standard Oil Co. of California of a gas compressor plant on U. S. Naval Petroleum Reserve 1 at Elk Hills at a cost of $292,000, according to an announcement made by Louis Dreves, chairman of the committee. The installation will recover natural gas and inject it into the formations to increase recovery of oil.

Natural Gasoline

Production of Liquefied Petroleum Gases Up

WASHINGTON. — Daily average production of liquefied petroleum gases rose 12 per cent in November, and that of natural gasoline declined 2 per cent, according to U. S. Bureau of Mines. The daily average output of natural gasoline and allied products was 12,354,000 gal., a new high, comparing with 12,045,000 gal. in October and with 10,762,000 in November 1943. The major increases in demand were for natural gasoline at refineries and for liquefied petroleum gases for fuel.

PRODUCTION
(Thousands of gallons)

	Nov.	Oct.
Natural gasoline	182,448	191,898
Cycle products	73,752	76,104
Liquefied petroleum gases:		
Isobutane*	18,690	18,312
Other LPG*	95,718	87,066
Liquefied refinery gas	19,572	17,388
Benzol	8,400	8,400
Total	398,580	399,168

*At natural-gasoline and cycle plants.

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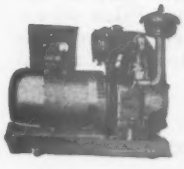
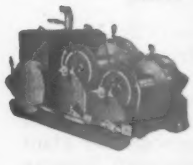
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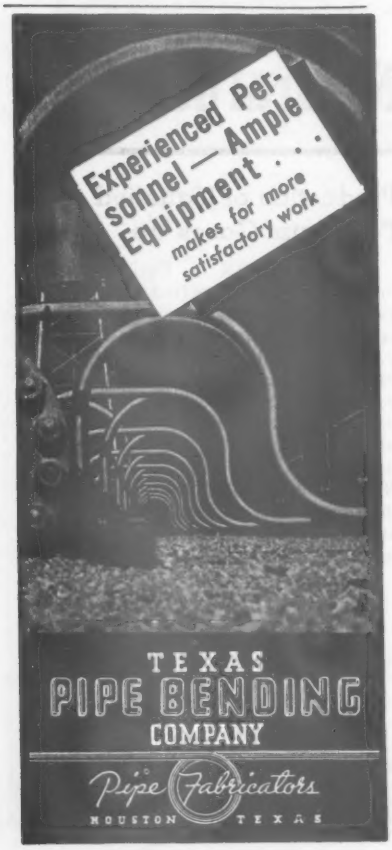

REFINING

Cosco's Wynnewood Plant Bought by Kerlyn Unit

OKLAHOMA CITY.—Fen-Ter Refining Co., wholly owned subsidiary of Kerlyn Oil Co., has purchased Cosco Oil Co.'s refinery at Wynnewood, Okla., and has taken over operation. The consideration is reported to have been more than $250,000. Fen-Ter was incorporated recently in Delaware and shortly afterward was granted a charter permit in Oklahoma.

The Wynnewood refinery has a rated daily capacity of 2,300 bbl. of crude and for several years has been operating on oil from the Robberson, Tussy and other fields of southern Oklahoma. It has specialized in fuel and road oils, most of which have gone to meet military needs.

The plant is to be improved and the capacity increased about 50 per cent.

Majority interest in Cosco was obtained from Mrs. Joshua S. Cosden, widow of the founder of the Cosden oil empire of a generation ago. Minority interests, represented by James F. Nagle, Tulsa, were obtained from J. S. Corden, Jr., now in the Marine Corps; Stanley Cosden and Ottelia Cosden Palmer. Nagle has been operating the refinery interests since young Cosden joined the colors more than a year ago.

Smallest Fluid-Catalyst Unit Makes Initial Run

CHEYENNE, Wyo.—Frontier Refining Co.'s fluid-catalyst unit—smallest in the world—has finished a successful 65-day run in actual service. This test is of importance as indicating that catalytic cracking, basis for many of the great wartime refining operations, is practical for the small refiner.

Fluid-catalyst cracking, vital in production of aviation gasoline, has been used almost exclusively in large-capacity plants. Designing a small unit presented special problems.

W. R. Newman, Frontier vice

Sketches of Plant Operators

DR. F. J. SANDERS, formerly superintendent of the Toledo refinery of The Standard Oil Co. (Ohio) and recently placed in charge of the company's No. 2 refinery in Cleveland, was born in Mundy, Tex., attended high school in Haskell, Tex., and graduated with the degree of chemical engineer from Texas Technological Institute. He was awarded his doctorate in chemical engineering at Yale University in 1933.

After brief employment in the dye industry, Dr. Sanders joined Standard Oil in 1934 to organize the technical service group of the manufacturing department's process and development division. He headed technical service for 5 years and in 1939 was placed in charge at Toledo. While he was there, new process units were installed, including alkylation, catalytic polymerization, cumene and dimer units, and a new delayed coking unit. All of these have a major part in war production, either in connection with 100-octane aviation gasoline or the manufacture of electrode and metallurgical grade coke. The No. 2 refinery is devoted exclusively to the manufacture of lubricating oils, greases and waxes.

Both Dr. Sanders and his wife are aviation enthusiasts and fly their own plane.

president, in the current issue of the company's publication, tells of operations of the unit, and of the company's refinery as a whole. Innovations introduced in design of the unit are:

1. Holding pressure on the regenerator, which allows it to be placed approximately on a level with the reactor, thereby reducing over-all height of the structure.

2. A specially designed scrubber to recover catalyst from the regenerator gas, in place of a much more costly precipitator installed in larger units.

The Frontier plant as a whole utilizes a combination of thermal and catalytic processes, designed and licensed by Universal Oil Products Co., balanced in relation to each other to produce all components of 100-octane gasoline.

The processes include thermal cracking and reforming, catalytic cracking, hydrogen fluoride alkylation and butane isomerization. Components of 100-octane gasoline include isopentane, alkylate and high-octane aviation base stock.

The fluid-catalyst unit produces isopentane, isobutane, olefins, aviation base stock and recycle gas oil. The thermal cracking and reforming units produce additional olefins and butanes which, with the olefins from the catalytic cracking unit, go to the hydrogen fluoride alkylation unit for manufacture into alkylate.

WLB Sets Wage Rates for Oil-Refinery Engineers

DALLAS. — Wage scales of $1.45 an hour for Class A oil-plant engineers or operators, and $1.25 for Class B were fixed by the Eighth Regional War Labor Board, Dallas, last week, settling a controversy between Continental Oil Co. and Refinery Employes Union of the Lake Charles, La., area.

The order, retroactive to November 21, 1944, includes a provision that "any employe who has either quit or been discharged since November 21, 1944, shall receive the amount of the increase for his classification up to the date on which his employment with the company terminated."

The board denied the union's request to change the classification of power-plant operators to power-plant engineers. Labor members dissented.

Gulf Coast Gasoline Stocks Register Minor Decline

HOUSTON.—Stocks of all grades of gasoline and naphthas at plants in Gulf Coast Refiners Association registered a minor decline in the first half of January, totaling 1,584,386 bbl., a drop of 33,228, compared with the inventories on December 31. A year ago the total was 1,393,790 bbl. Automotive gasoline stocks considered alone were 553,868 bbl., an increase of 137,790, but only 48 per cent of the 1,083,684 bbl. reported January 15, 1944. Total stocks of all products in plants of the association members were 3,706,330 bbl., a falling off of 431,983 during the first 2 weeks of January. Last year the total was 3,329,241 bbl., and 2 years ago 5,921,017.

Plant shutdowns for cleanout and repairs resulted in a decrease in crude runs to stills, which were 109,130 bbl. daily, compared with 132,280 daily during the last 2 weeks in December. Crude runs were 75.2 per cent of rated operating capacity, contrasted with operations at 79.7 per cent of capacity a year ago.

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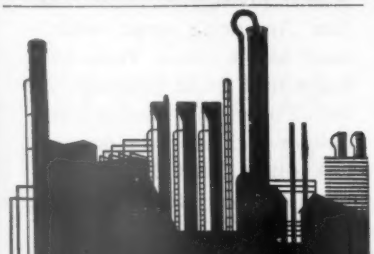

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Down in the southern flat lands of Texas and Louisiana the new pipe line of the Tennessee Gas & Transmission Company encounters some of the worst soil corrosion conditions to be found in its 1300-mile bee-line from Corpus Christi, Texas, to Kenova, West Virginia.

In this section of swamps, rice fields, low bottom lands of the Gulf area, the line is coated with Bitumastic 70-B Primer and Enamel to give it long-time, reliable protection against deterioration from corrosion.

Uniform coatings of Bitumastic 70-B Primer and Enamel, together with a 15-pound coal tar saturated asbestos felt, are applied to the outside surface of the 24-inch diameter pipe by line traveling, cleaning, priming, coating and wrapping machines.

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PIPE LINES

Whitman Becomes PAW Pipe-Line Operations

WASHINGTON.—Clayton H. Whitman, Shreveport, last week was appointed assistant director of the Supply and Transportation Division, Petroleum Administration for War.

He will be in charge of the sections concerned with pipe-line engineering and construction activities, pipe-line operations and crude-oil supply. He succeeds Bruce Clardy, who resigned after 2 years' service to resume operations as an oil well drilling contractor and crude-oil producer in Texas.

Formerly manager of the crude-oil purchasing department of the Standard Oil Co. of New Jersey, Whitman has had 30 years' experience in the oil industry. He began his career in the oil industry in 1915, in the yield and cost department of the Standard Oil Co. of Louisiana at Baton Rouge.

In 1926 he became assistant to the head of the coordination department of the Standard Oil Co. of New Jersey, with offices in New York City. He served with the same company as manager of the crude-oil purchasing department in Shreveport from 1937 until he joined PAW.

Bayou Pipe-Line System Sets Throughput Record

Shell Pipe Line Corp. reports that for the month of January the Bayou Pipe Line System pumped a new record daily average throughput of refined products into Baton Rouge and Port Allen, La., of 65,091 bbl. When pumping gasoline alone the 10-in. line averaged 67,921 bbl. while the 8-in. line into Port Neches, Tex., averaged 44,015.

For the year 1944, the 10-in. line averaged 63,068 bbl. However, it is a fact that the Bayou system could not be supplied to full capacity. The 8-in. line with full supply averaged 42,150 bbl. for the year. The average handling loss for the year including that in connected refiners and terminal tanks was 0.12 per cent.

Sinclair Operates Crooks Gap Line

Welding of the 23-mile 8-in. crude oil from Lost Soldier to Crooks Gap, Wyo., has been completed for Sinclair Refining Co. by O. C. Whitaker Co. Because of winter conditions it was necessary to lay nearly all the line temporarily on top of the ground. It is now in service and will be buried when weather conditions become favorable for ditching later in the year.

Survey for the 36½ miles of 8-in. line from Big Sand Draw to Crooks Gap has been completed.

Sackett Heads Casper, Wyo. Division of Ohio Lines

R. M. Sackett has been appointed division superintendent of the Casper division, pipe line department, The Ohio Oil Co., succeeding P. W. Hennessey. Sackett started with the company as a telegraph lineman in 1919. Subsequently he has served as superintendent of communications in Wyoming and assistant division

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superintendent. During Hennessey's absence from the division since last September Sackett served as division superintendent.

Because of ill health, Hennessey, division superintendent of the Casper division, has been granted a leave of absence. He has had almost 40 years of continuous service with The Ohio Oil Co. Hennessey started as telegraph operator and advanced to superintendent of communications of the company's Wyoming division. For a period of 2 years he was located in the general office at Findlay as general superintendent of the pipe-line department. Hennessey returned to Casper in August 1943 at the time that new crude-oil production was discovered in the Elk Basin field.

Peak Load Measures Of Ontario Gas Lines

For handling peak loads in the winter in Ontario the project of Union Gas Pipe Line Co. of Canada to build a 70-mile line to the Dawn field from a connection with Panhandle Eastern Pipe Line Co. at Detroit, will be an innovation in Canadian practices by serving a program for underground storage of natural gas to come from southwestern fields of the United States. In Ontario the peak loads have been met by natural and refinery gases drawn from underground storage and by utilization of liquefied petroleum gases at certain points.

Pipe-Line Economics Study Issued by ICC

The Interstate Commerce Commission's bureau of transport economics and statistics has issued a study of "War-Built Pipe Lines and the Postwar Transportation of Petroleum," the second in a series dealing with aspects of postwar-transportation conditions.

The study, which has not been considered or adopted by the ICC, was prepared by Sam G. Spal, associate economist, under the direction of Charles S. Morgan, chief carrier research analyst.

The report is arranged in three major divisions—the prewar period, the war period to date, and the postwar period. The first part traces the development of petroleum pipe lines and the division of traffic in petroleum and its products among the several agencies of transportation in the prewar period.

The second part describes the problems encountered in the transportation of petroleum under war conditions and how these difficulties were met. The third part analyzes the relative costs of the several carrier agencies in the transportation of petroleum, and the fourth part considers the postwar competitive position of the pipe lines.

Employe Representation Is Discussed With WEP

In discussion of employe representation it is reported by National Labor Relations Board that War Emergency Pipelines, Inc., asserts that the only appropriate unit for collective bargaining should be system wide. However, as a result of a recent election, NLRB has certified Oil Workers International Union as the representative of certain classes of employes in the first division of WEP.

Cities Service Completing Blackwell-Caney Line

Cities Service Gas Co. has been completing this week 80 miles of 16-in. line from Blackwell, Okla., to Caney, Kans. The project, which was carried on through the latter part of 1944, is being finished in the Shidler, Okla.-Caney, Kans., section which was contracted by Sharman & Allen. The Blackwell-Shidler section had been previously laid under contract with Oil States Construction Co.

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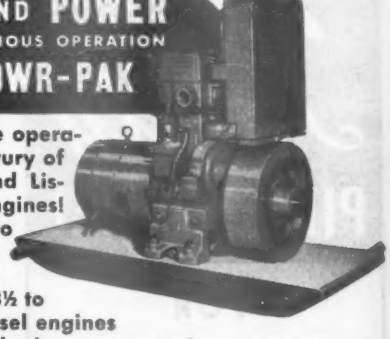

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Superior Equipment Co. Forms New Pipe-Line Division

THE Superior Equipment Co. of Bucyrus, Ohio, which recently purchased the manufacturing rights of all Cardwell pipe-line and industrial sideboom equipment, is well qualified for the important job before them.

Walter J. Michael, president of the company, is also president of Ohio Locomotive Crane Co. Michael has spent his lifetime in the business of manufacturing cranes of all types. O. E. (Ted) Murrey, formerly sales manager of the pipe-line division for Cardwell Manufacturing Co., has resigned his position with that company to take over the sales and service departments for Superior Equipment Co. Superior's large plant is completely equipped with modern machine tools, etc., and has sufficient capacity to accommodate the extensive increase in business in this line foreseen in the future.

Production schedules for complete units have been set up for the full year of 1945. It is the company's intention to be able to make immediate deliveries of sidebooms or back fillers for current-model tractors in the very near future. The factory stock of spare parts will be built up and will be operated on a minimum and maximum basis, so that a minimum of time will be lost in shipments of spare parts to customers in the field.

The well-equipped, engineering department of Superior Equipment Co. is staffed with men experienced in all types of crane construction. These engineers will make frequent visits to the field to study the conditions under which the equipment works and to talk to operators and owners, gathering new ideas for the improvement of all models.

It is the intention of the new company to make several needed changes for the improvement of this new line of equipment as early as possible. Later the complete line will be redesigned and modernized. When all improvements have been made, production will be standardized and only a minimum of deviation from standard models will be allowed. It is believed that such a practice will greatly increase ability to service equipment in the field as well as to make more prompt the deliveries of new and complete units.

All sales will be handled through established distributors.

Walter J. Michael, president, The Superior Equipment Co., and Ohio Locomotive Crane Co.

O. E. (Ted) Murrey, manager of sales and service, The Superior Equipment Co.

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In order to meet the increased demand for "Cardwell" drilling and servicing rigs, we have sold our pipe-line equipment division to The Superior Equipment Company, Bucyrus, Ohio. Our production facilities are now devoted entirely to the manufacture of oil-field equipment.

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Exploration and Drilling

Week's Highlights

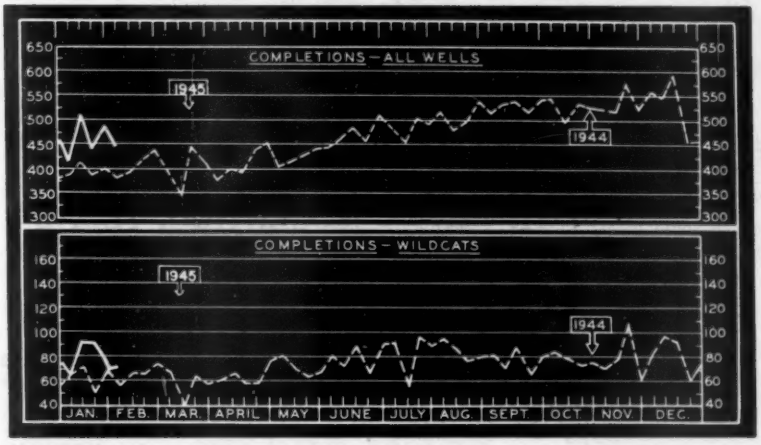
THE Powder Wash field in Moffat County, Colorado, is giving the Rocky Mountain geologist food for thought, not only as to possibilities of additional Tertiary production, but also about the origin of the oil.

The field is on a broad gentle dome covering a surface area of 4,100 acres with about 80 ft. of closure on a northwest-southeast axis. It lies well out in the Sand Wash portion of the Washakie Tertiary basin of southern Wyoming. The surface rocks are Lower Middle Eocene and the production comes from the Wasatch, which is Lower Eocene, the oil being found in irreguar lenticular deposits. The surface section shows intertonguing of the Green River with the Wasatch.

The Green River basin is well known for its enormous oil-shale deposits in Wyoming, Colorado and Utah. At Powder Wash it is predomintely shale and limy shale of brackish lake water origin, while the Wasatch is a dominantly red section of shale, shaley sand, sand and minor coal deposits, and is a continental and lagoonal deposit.

There is no evidence that the intertonguing of the Green River has anything to do with the presence of oil in the Wasatch. On the contrary, the available evidence indicates that the source of the oil is in the Wasatch itself, despite its predominantly red section. In at least two places in northwest Colorado where the Wasatch outcrops—in the Petrolite hills near Meeker, and on the east flank of the Rangely anticline—a sand at the base of the Wasatch shows saturation of light, paraffin-base crude.

One of the newer theories of the origin of oil makes a sharp distinction between conditions under which oil-shale deposits and their kerogen content can originate, and the conditions under which a substance labeled neokerogen is formed which ultimately becomes petroleum. It will be interesting to see how this hypothesis checks with the conditions at Powder Wash, where the Green River tongue carries a low-grade oil-shale section directly into the upper Wasatch, above the oil-bearing section.



Solid line charts current weekly completions, service wells in Eastern area included

COMPLETIONS IN ALL FIELDS . . .

Week ended February 3, 1945

	Oil	Gas	Dry	Total	Footage	Total Comp. to date 1945	Total Comp. to date 1944
N. Y., Penna., W. Va.	40	23	*44	107	168,528	490	292
Ohio	5	1	7	13	41,849	64	77
Indiana	0	0	1	1	2,794	18	31
Kentucky	1	0	3	4	9,193	30	66
Illinois	30	0	9	39	96,629	194	158
Michigan	2	0	7	9	22,575	66	43
Kansas	16	3	17	36	121,260	137	169
Nebraska, Missouri, Iowa	0	0	0	0	0	6	9
Oklahoma	32	2	11	45	192,215	223	123
Texas:							
North Central	26	0	15	41	103,109	190	93
West	23	0	8	31	147,922	153	135
Panhandle	5	4	1	10	31,234	50	12
Eastern	1	0	2	3	21,126	23	32
Gulf Coast	17	6	9	32	226,447	153	35
Southwest	7	0	3	10	56,489	55	92
Total Texas	79	10	38	127	586,327	624	399
Louisiana:							
Northern	3	0	1	4	32,973	27	20
Southern	5	1	2	8	67,873	56	32
Total Louisiana	8	1	3	12	100,846	83	52
Arkansas	0	0	2	2	8,525	16	17
Mississippi	5	0	2	7	40,972	29	17
Southeastern States	0	0	0	0	0	2	†
Montana	3	2	1	6	11,338	29	23
Wyoming	2	0	0	2	9,058	22	10
Colorado-Utah	0	0	0	0	0	4	2
New Mexico	6	0	3	9	30,410	47	39
California	24	0	5	29	130,277	221	163
Total United States	253	42	153	448	1,572,796	2,305	1,690
Total previous week	254	60	176	490			
Total Feb. 5, 1944	224	29	91	344			

*Includes 39 service wells. †Included in total shown for Mississippi.

EASTERN TEXAS

Pickton Pool's Second Well Near Completion

DALLAS.—Hunt Oil Co. 1 M. C. Spigner, northwest offset to the discovery well in the Pickton field, Hopkins County, is flowing into tanks, ungaged, after perforating casing opposite Bacon lime from 7,892-7,903 ft. Like Humble Oil & Refining Co.'s discovery well, cores from Hunt's test indicated only about 10 ft. of pay section. Despite the thin section, the discovery made 620 bbl. through ¼-in. choke in 24 hours. Meanwhile, nearly 2 miles northeast of the field, Sun Oil Co. 1 Turner, A. Lazarin Survey, missed the Bacon lime pay in coring and drilling below 8,069 ft., with no shows, and was drilling ahead through the Rodessa section.

Titus County.—Humble 1 Searcy, 1½ miles south of Mt. Pleasant, showed salt water with sulfur odor on drill-stem test at total depth of 11,827 ft., probably in the Smackover lime. It had cored 11,794-827 ft., recovering slightly porous lime with sulfur odor, then ran an unusually long test, open 12 hours and 26 minutes, with packer at 11,810 ft., ¼-in choke, using a 6,000-ft. water blanket. It started flowing water after tool was open 11 hours.

Henderson County.—Gulf Oil Corp. 1 Frizzell, a mile east of Baxter, is drilling below 10,916 ft. in anhydrite. Humble 1 Jones, near Eustace, is past 5,920 ft. The Texas Co. 1 Morse, south of Chandler, is conditioning hole to drill ahead after cleaning up fishing job at 9,966 ft.

Smith County.—Two deep operations in the South Tyler area continue making hole with no details yet released on shows encountered. Phillips Petroleum Co. 1 Grelling, Thos. Price Survey, is drilling at 9,530 ft. in shale and lime and same company's 1 Englander, D. T. Quevado Survey, is past 10,834 ft. Same operator is starting operations on two additional locations in the area, both of which were staked some time ago. The 1 Mrs. Leo Dark, 1,350 ft. east of 1 McMinn, the discovery well, is clearing location while 1 Harriston-Johnson, John Roper Survey, is moving in materials. Sinclair Prairie Oil Co. 1 Shofner, projected 13,000-ft. Smackover lime test at Chapel Hill, is past 7,000 ft.

Freestone County.—The Texas Co. 1 McKnight, west of Fairfield, has started perforating and testing porous zones in the Travis Peak which promise gas-distillate production. First test on perforations at 8,438-42 ft. resulted in slight show of gas along with salt water and these perforations have been squeezed off to test higher, above the water level.

EASTERN TEXAS WILDCAT COMPLETION

Anderson County: J. B. Daniels 1 J. H. Handorf, Joseph Humphrey Sur., 5 mi. N Palestine, elev. 482 ft., Austin chalk 4,911 ft., Woodbine 5,430 ft., dry, TD 5,518 ft.

N. CENTRAL TEXAS

Strawn Proves Productive In New Cooke County Pool

WICHITA FALLS.—The Texas Co. 2 Gainesville National Bank, Thomas Ward Survey, east offset to same company's 1 Gainesville National Bank which last December was completed as a good producer from Ellenburger at 5,374-5,485 ft., has found a higher pay in the Strawn section. On drill-stem test from 4,766-79 ft., in Strawn sand, it flowed pipe-line oil after tool was open 21 minutes, showed no water and was drilling ahead. Previously, a 20-minute drill-stem test at 4,217-33 ft. showed 810 ft. clean oil and 1,440 ft. salt water. Both wells are about ¾ mile north of the Walnut Bend field, Cooke County.

Pure Oil Co. 1 Little, Grayson County wildcat which is expected to make a producer from the Ordovician zone around 9,000 ft., is trying to free stuck drill pipe at 9,532 ft. In eastern Grayson County, A. L. Andree et al 1-A Whiting estate, 4 miles north of Bells, is reported drilling ahead at 3,252 ft. in shale.

Jack County.—Hanlon-Buchanan, Inc., staked locations for three 6,000-ft. tests on its J. H. Shown lease, McDonald field, 2 miles southeast of Antelope, and location for another 6,000-ft. hole in the Hanlon (Strawn) field 6 miles south of Antelope at 1-D Ellis DuBoise, J. W. Williams Survey. Also adding to deep exploration in the county is a new location by Shell Oil Co., Inc., for 1 T. M. Easter, northwest corner of J. D. Sinclair Survey A-1,493, 7 miles southeast of Jermyn, to be drilled to 5,000 ft.

NORTH CENTRAL TEXAS WILDCAT COMPLETIONS

Archer County: Bridwell Oil Co. 1 Margaret Hancock, Sec. 3, Blk. 1, H&TC Sur., 5 mi. E and 3 mi. N Luke Wilson, elev. 926 ft., Caddo 5,231 ft., Ellenburger 5,556 ft., dry, TD 5,694 ft.

Baylor County: Akin & Dimock 1 Tom W. Farr, Sec. 228, T&NL Sur., ½ mi. E Rendham, dry, TD 3,266 ft.

Cooke County: A. G. Hill 1 L. M. Atcheson et al, Sec. 14, W. D. Easley Sur., 3 mi. W Hood, elev. 965 ft., schist 3,044 ft., dry, TD 3,084 ft.

S. D. Johnson 1 R. M. Zipperer, Geo. Ivy Sur., 1 mi. N Muenster, elev. 1,069 ft., dry, TD 2,016 ft.

Jack County: A. D. Dillard 1 J. R. Marley, Sec. 4, WCRR Co. Sur., 5 mi. E Bryson, dry, TD 3,430 ft.

Montague County: The Texas Co. 1 L. A. Hutson, G. W. Fletcher Sur. A-208, 15 mi. NE Montague, top pay 1,892 ft., pumped 78 bbl. dry, TD 4,185 ft.

Young County: Dwight Ross & Nu-Enamel Operating Co. 1 H. C. Wells, Sec. 734, TE&L Co. Sur., 8 mi. SW Newcastle, elev. 1,158 ft., Mississippian 4,649 ft., Chappel 4,660 ft., dry, TD 4,686 ft.

ROCKY MOUNTAIN

Wildcat Interest Shifts To Colorado and Utah

DENVER.—The wildcat play in the Rocky Mountain area, which was centered principally in Wyoming and Montana the past 2 years, shows evidence of continuing on the 1944 pace this year, only the principal scene of activity will shift to Colorado and eastern Utah.

Last week it was reported in this column that the development of production in the Weber horizon at Rangely, in western Colorado, had brought the big Uintah Basin in eastern Utah into the limelight. A similar situation is developing in northwestern Colorado where The Texas Co. and The California Co. are drilling a Weber sand test in the prolific Wilson Creek field. This field is producing from the Sundance at around 6,000 ft., and it is generally believed that it will find production in the Weber. This structure is on the southern rim of another big basin in which are located the Iles, Hamilton and other fields producing from horizons above the Weber.

Eastern Colorado, extending from the mountain range through the center of the state to the Kansas and Nebraska lines, was the scene of one of the great land plays by the major companies in 1935 and 1936 and around 5,000,000 acres were leased. Thirty-eight blocks had been assembled after extensive seismic, geological and core-drilling surveys. Only seven or eight deep tests had been drilled on these blocks when the Illinois field developed a big play and the majors decided to put eastern Colorado "on the ice" until a more opportune time. Most of the blocks were released and very little prospect drilling has since taken place. It now appears that the majors

DAILY AVERAGE PRODUCTION FOR WEEK

	Feb. 3 crude oil	Distillate, allied products	February PAW quota all oils	Jan. 27 crude oil
Alabama	300	.....	300	300
Arkansas	81,550	5,200	85,200	81,300
California	897,550	58,000	951,800	895,250
Colorado	9,750	.....	9,500	8,900
Eastern	63,300	8,700	76,900	63,000
Illinois	196,800	12,000	210,000	209,700
Indiana	13,300	.....	12,000	12,600
Kansas	257,400	5,000	279,000	267,200
Kentucky	30,200	3,800	35,800	29,400
Louisiana	357,500	37,000	397,000	357,200
North Louisiana	68,300	.....	.....	68,000
South Louisiana	289,200	.....	.....	289,200
Michigan	46,800	850	47,850	46,700
Mississippi	48,150	.....	53,000	48,850
Montana	22,350	300	23,300	22,600
Nebraska	950	.....	1,000	950
New Mexico	103,050	5,100	110,100	103,000
Oklahoma	363,800	28,500	388,500	361,900
Texas	2,149,450	150,000	2,290,000	2,135,150
East Texas	400,000	.....	.....	385,700
East Central Texas	144,050	.....	.....	144,050
North Central Texas	143,150	.....	.....	143,150
Texas Panhandle	88,700	.....	.....	88,700
West Texas	478,600	.....	.....	478,600
South Central (S. A.)	20,050	.....	.....	20,050
South Texas (Laredo)	78,400	.....	.....	78,400
Lower Gulf Coast	243,900	.....	.....	243,900
Upper Gulf Coast	552,600	.....	.....	552,600
Wyoming	91,100	3,600	103,600	92,700
Total United States	4,733,300	318,050	5,074,850	4,736,700
Change from previous week	down 3,400	.....	.....	.....
Total production January 1-February 3, 1945				160,358,150 bbl.
Same period last year				149,024,375 bbl.

A SIZE FOR EVERY JOB

UNIT NUMBER	STRUCTURE RATING API POUNDS
A-140-TC	14,000
A-110-TC	11,000
A- 80-TC	7,500
A- 50-TC	5,100

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are coming back into eastern Colorado and are again leasing some of the old blocks and preparing to send in geophysical crews this spring. At least two deep tests already are scheduled and others are expected to follow.

Clark's Ford discovery on production.—General Petroleum Corp. 1 Government, C NW NW 25-9s-22e, Clark's Ford structure, 6 miles west of the Elk Basin field, Carbon County, Montana, which was included in the 1944 discoveries, has been given a production test and flowed at the rate of 200 bbl. per day of 47°-gravity oil from the second Frontier at 6,525 ft., total depth.

North Big Hollow test dry.—Wasatch Oil Refining Co. 3 Oklahoma-Fuller, C SE NW 7-15n-75w, North Big Hollow, Albany County, Wyoming, had the top of the Tensleep at 2,406 ft., and drilled to 2,835 ft. The first 15 ft. showed slight saturation, followed by water. It will plug back and complete in the Muddy at 792-814 ft. Another Tensleep test will be drilled.

Kicking Horse southern limits defined.—Husky Refining Co. 1 Nobel, C NW NE 20-36n-1e, Kicking Horse area, northeast of the Kevin-Sunburst field, was abandoned at 2,375 ft. after encountering water in three sands down to and including the Ellis-Madison contact. Location is 1¼ miles south of 1 Rankin, the discovery well, which was completed last fall at 2,040 ft. for 20,000,000 cu. ft. of gas in the contact. A southeast offset to the discovery was a smaller well.

WYOMING WILDCAT COMPLETION

Carbon County, Bailey: Sinclair-Wyoming 1 Coffman, SE NE NE 21-26n-89w, TD 5,234 ft., flowed 381 bbl. in 16 hours from the Sundance sand through perforations, top of Sundance 5,093 ft., gravity of oil 34.6°.

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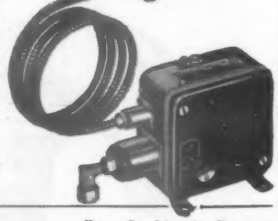
Dual Ignition Applications. Opens battery circuit and grounds magneto.



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MONTANA WILDCAT COMPLETION

Toole County, Kicking Horse: Husky Refining Co. 1 Nobel, NW NE 20-36n-1e, TD 2,375 ft., water in Ellis-Madison at 2,360 ft., water in Sunburst at 2,075-2,100 ft., water in Ribbon sand at 2,330-60 ft., dry.

SOUTHWEST TEXAS

Goliad and Kleberg Counties Have Strikes

CORPUS CHRISTI.—Amerada Petroleum Corp. 1 Albert Waitschies, wildcat, 12 miles northeast of Goliad, in the E. J. Armstrong Survey, Goliad County, on 24-hour potential test flowed 22 bbl. oil and no water, through ¼-in. choke, tubing pressure 300 lb. and 0 lb., casing pressure 210-110 lb. (at end of test), gas-oil ratio 1,509 to 1, gravity 40.3°, from 60 perforations at 5,920-35 ft. Total depth is 13,266 ft., with 5½-in. casing set at 5,979 ft., 2-in. tubing at 5,930 ft. Field name has not yet been assigned to this discovery.

Tide Water Associated Oil Co. 1 E. W. House, discovery well, approximately 2 miles west of the Kingsville field, Kleberg County, on 24-hour potential test flowed 208 bbl. oil through ⅛-in. choke, tubing pressure 1,275 lb., casing pressure 1,575 lb., gas-oil ratio 870 to 1, corrected gravity 37.2°, from perforations in Frio at 7,266-68 ft. Total depth is 8,650 ft., with 5½-in. casing set at 8,515 ft.

SOUTHWEST TEXAS WILDCAT COMPLETIONS

DeWitt County: Rowan & Hope & Ranger 1 J. C. Wallis, H. P. Cook Survey, 4 miles south of Westhoff, dry at 6,502 ft.
Sohio 1 E. G. Schiwetz, Agapo Mancho Survey, Abstract 703, 2 miles southwest of Yorktown, dry at 8,403 ft.

Duval County: Hiawatha Oil & Gas 1 Raul Oliveira, Andres Garcia Survey, Abstract 657, 3 miles southeast of Benavides, dry at 6,065 ft.

Goliad County: Amerada 1 Albert Waitschies, E. J. Armstrong Survey, 12 miles northeast of Goliad, top sand 5,920 ft., TD 13,266 ft., perforated 5,920-35 ft., PT 22 bbl. day ¼-in. choke, gas-oil ratio 1,509, tubing pressure 300-0 lb., casing pressure 210-110 lb., gravity 40.3°, no water.

Hidalgo County: Barnsdall 1-A C. F. Winfield, Manuel Gomez Grant, Valley Farms Subdivision, Block 44, 20 miles west of Edinburg, dry at 7,231 ft.

Karnes County: Southern Minerals 1 S. Lorenz & R. L. Mendoza, J. A. Lorenz Pre-Emp. Survey, 10 miles northeast of Karnes City, dry at 4,256 ft.

Kleberg County: Tide Water 1 E. W. House, Ricardo discovery, Kleberg Town & Improvement Subdivision, 2 miles northeast of Ricardo, top sand 7,243 ft., TD 8,650 ft., perforated 7,266-68 ft., PT 208.42 bbl. daily, ⅛-in. choke, gas-oil ratio 870, tubing pressure 1,275 lb., casing pressure 1,575 lb., gravity 37°, no water.

Nueces County: L. M. Lockhart 1 Carrie Cheeves, San Antonio de Agua Dulce and Casa Blanca Grants, 2 miles north of Banquette, TD 9,097 ft., perforated 5,168-82 ft., PT 2,000,000 cu. ft. gas, open flow, plus 11 bbl. condensate and 16 bbl. salt water.

Victoria County: Raymond D. Reynolds et al 1 Sallie E. Ragsdale, J. H. McConnaughey Survey, 5½ miles southwest of Inez, TD 5,978 ft., perforated 4,436-44 ft., PT 36,000,000 cu. ft. gas, open flow.

Webb County: Union Producing & Continental 1 O. W. Killam, Rafael Sciaraffa Survey, ½ mile northwest of Reiser, dry at 8,115 ft.

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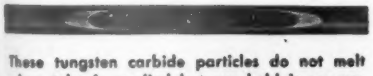

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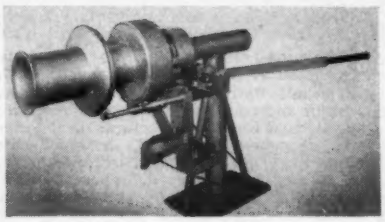

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CALIFORNIA

Paloma Field Extension Flows 610 Bbl. Black Oil

LOS ANGELES. — General Petroleum Corp. extended the northern limits of the Paloma field several days ago by completing 58-28 Benco, flowing 610 bbl. of black oil from the Paloma sand of Miocene age at 11,320 ft. After this well has been on production for a period of 30 days it will be eligible for entrance into the Paloma unit plan. Superior Oil Co. has started work on 38-35 Anderson in 35-31s-26e, and 74-34 Houchin in 34-31s-26e. Both wells are considered to be in proved locations because of their proximity to producing wells of the unit plan. Their completion would extend the field about two locations down the north flank and would prove up some additional locations. Two types of crude are being produced, a normal black crude oil and the volatile condensate from which is extracted the butanes and isobutane. Current production is being limited to the capacity of the recycling plant which may be enlarged at some future date as developments warrant. Drilling operations within the proved limit of the field have been reduced to a low level, there being no reason to step up the scope of work.

Barnsdall Oil Co. has not yet concluded work on 44 Rancho San Francisco in the Newhall Potrero field of Los Angeles Basin and consequently the status of this well must remain conjectural until tested. It is generally agreed, however, that Barnsdall has greatly increased the reserves of the field by its apparent discovery of additional sands. The Sesnon sand of Eocene age has not yet been reached. Barnsdall's deep test, now below 11,000 ft., has greatly stimulated interest in this area and has resulted in considerable leasing a few miles southeast of the Newhall Potrero field.

Standard of California has apparently failed to find anything of interest in its deep test in the Semitropic field but appears to have found a new possibly productive gas sand below the sands already productive in this field. This deep test was carried down to 14,770 ft. and then plugged back to 4,134 ft. A formation test indicated a flow of about 7,500,000 cu. ft. daily from the interval at 4,095-4,120 ft. A successful completion would extend the Semitropic gas field a few locations but of more importance is the fact that Standard has uncovered a new gas sand. Developments during the next day or two may indicate whether this new sand will become a factor in future gas production of this field.

CALIFORNIA WILDCAT COMPLETIONS

Fresno County, Tranquillity: Texas 36-23 Cal. Cotton, 23-16s-15e, top Kreyenhagen 7,620 ft., green sand 8,515 ft., base Domengine 8,527 ft., bottomed in Cretaceous sand, TD 9,320 ft., dry.

Kern County, Blackwell's Corner: Atlas Production 1 Ellis, 19-26s-19e, no important showings of oil or gas, TD 1,120 ft., dry.

Old River: Richfield 2 K.C.L., 3-31s-26e, swabbed water with trace of oil, TD 8,661 ft., dry.

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2-DU-5

CANADIAN FIELDS

Steveville and Twin River Devonian Tests Dry

CHATHAM.—In the Steveville field, Empire Petroleum 1, LSD 7, 11-19-11w4, finished at 4,186 ft. with Devonian contact at 4,065 ft. has been abandoned, lime being tight noncommercial oil shows and no water. In the Atlee area, east and a little north, Goyette-Solloway 1, LSD 9, 30-20-7w4, was completed dry at 4,500 ft. with Devonian around 3,920 ft.

Twin River.—In the Twin River area, near the Montana boundary, Pacific Oil & Refining 3, LSD 1, 10-2-20w4, is coring after getting Devonian contact at 5,355 ft.

Turner Valley.—In the Turner Valley North Extension, Foothills Oil & Gas 20, LSD 14, 4-21-3w5, is testing Madison limestone at 8,162-8,568 ft.

Conrad.—In the Conrad field, southeast of Taber, Conrad-Province 55-33-B, LSD 11, 33-5-15w4, at 3,084 ft. reports recovery of 4 bbl. an hour in swabbing tests of Ellis sand.

Northern Foothills. — In the Nordegg-Brazeau area of the northern Alberta foothills, an important deep test is being undertaken jointly by a group of Calgary companies headed by Home Oil and Anglo-Canadian Oil Co. Tentative location has been made in 17-43-17w5, in unsurveyed territory ½ mile northeast of Home-Brazeau 1 which in 1937 proved gas and naphtha in the structure. Home-Brazeau 1, LSD 16, 7-43-17w5, had gas at 6,645 ft. with a flow of 10,000,000 cu. ft. at 8,480-550 ft., but was abandoned at 8,728 ft. after the well faulted back from Fernie to Blairmore formation. Shell Oil Co. of Canada, Imperial Oil, Ltd., and Socony-Vacuum Exploration Co. are interested in the new test.

Vermilion.—In the Vermilion field, Vermilion Consolidated 15, LSD 6, 12-49-1w4, which showed oil in seven horizons to 4,031 ft. with gas at 2,640-50 ft., is gunperforating and testing before deepening The well, the first deep test in the Vermilion field, had the Devonian limestone at 2,024 ft. and a salt bed at 3,480-3,621 ft.

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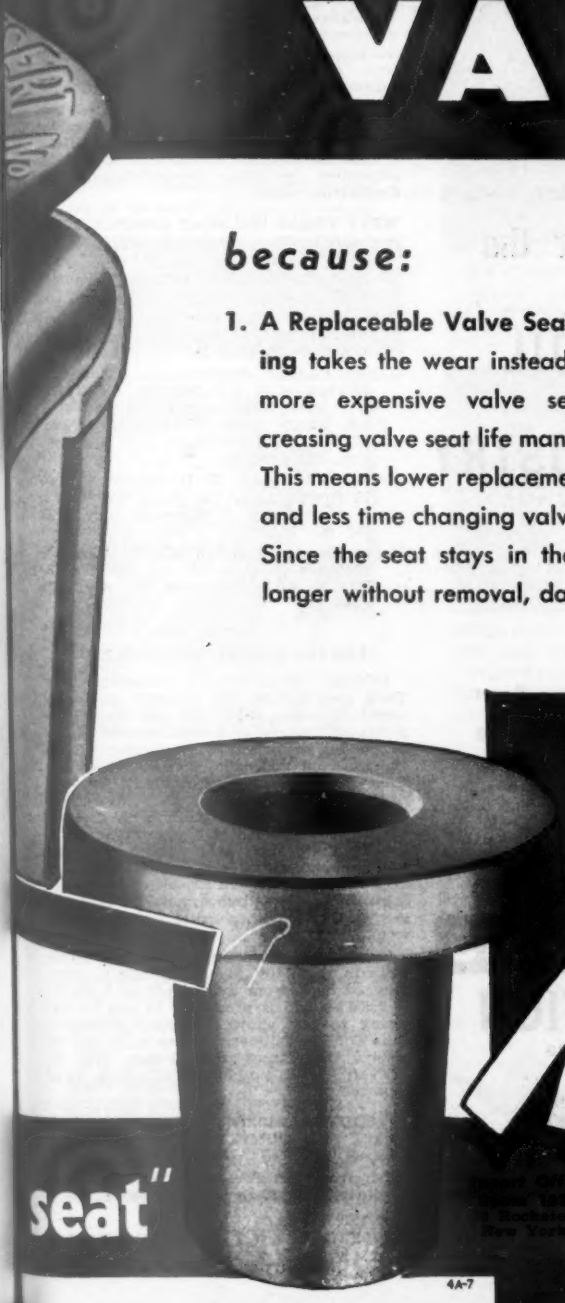

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HUMBLE ROAD HOUSTON, TEXAS

4A-7

PERMIAN BASIN

New Pool Discovery in Andrews Appears Likely

MIDLAND.—Promise of a new pool in southwestern Andrews County is indicated by Shell Oil, Inc., and The Texas Co. 1 Ratliff and Bedford, a projected 11,000-ft. Ordovician wildcat in Section 4, Block 73, PSL Survey. On a 75-minute drill-stem test from 7,755-7,844 ft., it started making gas after 20 minutes, flowed gas-cut mud in 50 minutes, flowed clean oil in 52 minutes and flowed oil into pits for 20 minutes. Operators pulled drill pipe, recovering 300 ft. of salty water. Gravity of oil was about 35°. Operators were reaming hole to core ahead. Analysis of formation samples is awaited to determine whether the oil showing is from the Wolfcamp, basal Permian formation, or from Pennsylvanian lime.

Coincident with the showing in this wildcat, Sinclair Prairie Oil Co. staked location for a deep test only about 3 miles southwest at 1 Geo. F. Ratliff, SW SE, Section 25, Block 73. It will be carried to 9,000 ft. to test the Devonian and Silurian zones but if no production is developed in those beds it will deepen to 11,500 ft. or to the Ellenburger. Meanwhile, production test is under way at another important southern Andrews County wildcat, Stanolind Oil & Gas Co. 1-D University, 5 miles northwest of the Embar field. It has plugged back to 9,100 ft. and is swabbing through tubing after using 500 gal. acid through casing perforations at 8,963-91 ft.

Now drilling ahead below 9,044 ft. toward its Ellenburger objective, Continental Oil Co. D-1-133 W. R. Settles, deep test in the Howard-Glasscock Permian pool, showed sufficient oil on drill-stem test to indicate commercial production from a deep pay zone, probably the Crinoidal lime of the Pennsylvanian formation. On drill-stem test from 8,925-43 ft., open 1 hour and 45 minutes, it showed gas in 1 hour and 25 minutes, recovered 2,000 ft. water blanket, cut with oil and gas, and 800 ft. of high-gravity sweet oil, with no indication of bottom-hole water. Pay section apparently is only about 10 ft. thick, as it was in black shale at 8,943 ft. and still is in that formation at present depth of 9,044 ft. If nothing is found in lower zones it will plug back and attempt completion.

Lubbock County.—Seaboard Oil Co. and Stanolind 1 Cravens, wildcat discovery in Section 16, Block D, L&SV Survey, is rigging up to complete as a pumper at plugged back depth 6,170 ft., where it swabbed 6 to 7 bbl. oil hourly after treating with acid. Magnolia Petroleum Co. 1 Johnson, in Section 88, Block C, D&WC Survey, cored dolomite with no shows at 10,066-76 ft. and is coring ahead.

Cochran County.—Stanolind 1 Slaughter, 8 miles northwest of Slaughter field production, is drilling below 9,535 ft. in gray lime. Operators plan to drill to 11,000 ft. unless Ellenburger or granite is encountered higher.

Presidio County.—Stanolind 1 Presidio Trust has been located in Section 99, Block 3, D&P Survey, for a deep test, with chief objectives probably Pennsylvanian and Ordovician sands.

WEST TEXAS WILDCAT COMPLETIONS

Crockett County: Sohio 1-A-14 J. S. Todd, Sec. 14, Blk. QZ, ELRR Sur., elev. 2,561 ft., Crinoidal 6,839 ft., dry, TD 6,985 ft.

Ector County: Hilo Oil 1 E. F. Cowden, Sec. 31, Blk. 43, T&P Sur., elev. 3,035 ft., dry, TD 4,530 ft.

Gaines County: Midway Oil 1 Lula A. Morrow et al, Sec. 200, Blk. G, WTRR Sur., elev. 3,384 ft., dry, TD 2,306 ft.

J. F. Smith 1 Mrs. Ruth Dodge, Sec. 36, Blk. H., D&W Sur., elev. 3,176 ft., dry, TD 5,250 ft.

McCulloch County: W. H. Vernor 1 Geo. E. Horne, L. J. Uct Sur., 938, ½ mi. E and 2 mi. N Mercury, dry, TD 531 ft.

Pecos County: Standard Oil of Texas 1 Florence G. Baldwin, Sec. 26, Blk. 8, H&GN Sur., elev. 2,520 ft., dry, TD 3,205 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Skelly Oil Co. 2 Steeler, Clear Fork lime test in the Penrose area and about 6 miles southwest of the Gulf-Drinkard discovery, showed a steady blow of gas and recovered 95 ft. of gas-cut drilling fluid on drill-stem test in top of the Clear Fork from 5,462-5,520 ft., and is drilling ahead below 5,620 ft. in lime. This showing compares favorably with gas-distillate shows found at the same level in the Drinkard area, where oil production was encountered at 6,400 ft. Gulf Oil Corp. 1 State-Andrews, 32-22s-38e, 1½ miles southeast of the discovery, is drilling below 6,300 ft., with verdict expected this week.

Humble Oil & Refining Co. 1 Federal-Keinath, deep test in eastern Lea County, plugged back from total depth of 9,954 ft. to 7,550 ft. and is preparing to run 5½-in. casing to test shows in lower Permian. Ohio Oil Co. 1 Jones, 7 miles southeast of Hobbs, is making a drill-stem test at 7,618 ft., with no shows of oil or gas reported.

SOUTHEASTERN NEW MEXICO COMPLETION

Eddy County: W. R. MacKenzie 1 Cook & Ironwide, Sec. 8-20s-29e, 2 mi. NE Russell field, dry, TD 1,204 ft.

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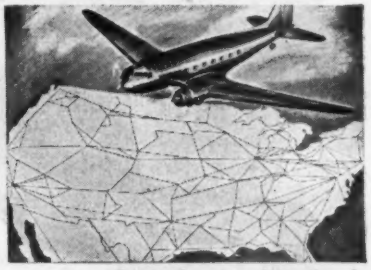

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SOUTH LOUISIANA

Iota Discovery Well Flowing 215 Bbl. Daily

NEW ORLEANS.—Union Sulphur, Inc., 1 Medlenka, 11-8s-2w, discovery well in Iota area of Acadia Parish, is completed flowing at the rate of 215 bbl. daily through ⅛-in. choke, from perforations at 9,380-90 ft., gravity 32.2°, tubing pressure 1,160 lb. It had previously flowed 264 bbl. per day on 14/64-in. choke, with gas-oil ratio 585 to 1, gravity 31.8°, from perforations 9,664-76 ft. but was killed to plug back and complete in the higher sand.

Union Oil Co. of California - Scheperle, 3-11s-9w, extension test at East Moss Lake field of Calcasieu Parish, is completed in the perforations at 10,432-44 ft. and is shut down with shut-in tubing pressure 6,100 lb. It flowed 70 bbl. condensate in 19 hours through ⅛-in. choke, tubing pressure 5,000 lb. Gravity is 48°. Total depth of the hole is 10,493 ft., with 5-in. liner set 10,488 ft.

Humble Oil & Refining Co. 3-B Pettit Anse Co., 23-13s-5e, at Avery Island in Iberia Parish, total depth 10,227 ft. in salt, 7-in. 9,924 ft., perforations 9,830-45 ft., 2½-in. tubing set at 9,784 ft., flowed at the rate of 486 bbl. per day through 5/32-in. choke, 202,000 cu. ft. gas daily, gravity 37.2°, gas-oil ratio 417 to 1.

Humble 1-C Wilberts Mineral Corp. et al, new sand discovery well at Bayou des Glaise field in Iberville Parish, was completed flowing 321 bbl. per day through 10/64-in. choke, tubing pressure 1,575 lb., gravity 36.2°, gas-oil ratio 785 to 1, from perforations at 10,237-64 ft. Total depth is 10,581 ft. with 5½-in. casing set at 10,332 ft., and 2-in. tubing at 10,163 ft.

Barnsdall Oil Co. 2 Jos. Fuselier, 38-7s-3w, northeast offset to the discovery well at West Tepetate field, Jefferson Davis Parish, is completed in 18 perforations at 8,520-26 ft., flowing 713 bbl. per day on 16/64-in. choke, 584,000 cu. ft. gas per day, gas-oil ratio 820 to 1, tubing pressure 1,475 lb., casing pressure 1,800 lb., total depth 9,236 ft., with 7-in. set near bottom.

Sun Oil Co. 8 Cypress, 75-15s-15e, Chacahoula field, La Fourche Parish, is testing in perforations 7,855-72 ft., flowing at the rate of 76 bbl. an hour through ½-in. choke with tubing pressure 1,250 lb. Total depth is 8,072 ft. in sandy shale, with 7-in. casing set at 8,044 ft.

The Texas Co. 7 Delta Duck Club Unit, 31-20s-20e, at Delta Duck field, Plaquemines Parish, flowed potential of 187 bbl. per day on ⅛-in. choke, gas-oil ratio 1,092 to 1, gravity 37°, from perforations 9,232-56 ft. Total depth is 10,004 ft. with 7-in. set on bottom.

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MICHIGAN

Coldwater Completion Highlights Dull Week

SAGINAW.—The midwinter lull in Michigan oil fields continued last week, nine completions being reported, including seven dry holes. Another big producer was completed in the Coldwater field in Isabella County, and a small well was completed in Allegan County. Four of the seven dry holes were wildcat tests.

MICHIGAN WILDCAT COMPLETIONS

Arenac County, Adams Township: Don Rayburn A-1 State-Adams, SW NE NE 11-19n-3e, dry in Dundee, TD 3,070 ft.

Ervin Major 1 Dexter Horton, NW NE NW Sec. 29, dry, TD 3,153 ft.

Kent County, Bowie Township: Three A Drilling Co. 1 Eva Davisson, NW NW SE 31-5n-9w, dry in Monroe, TD 2,256 ft.

Ottawa County, Holland Township: Southwest Development Co. 1 DeFouw estate, SW SW NW 10-5n-15w, dry in Traverse limestone, TD 1,941 ft.

APPALACHIAN FIELD

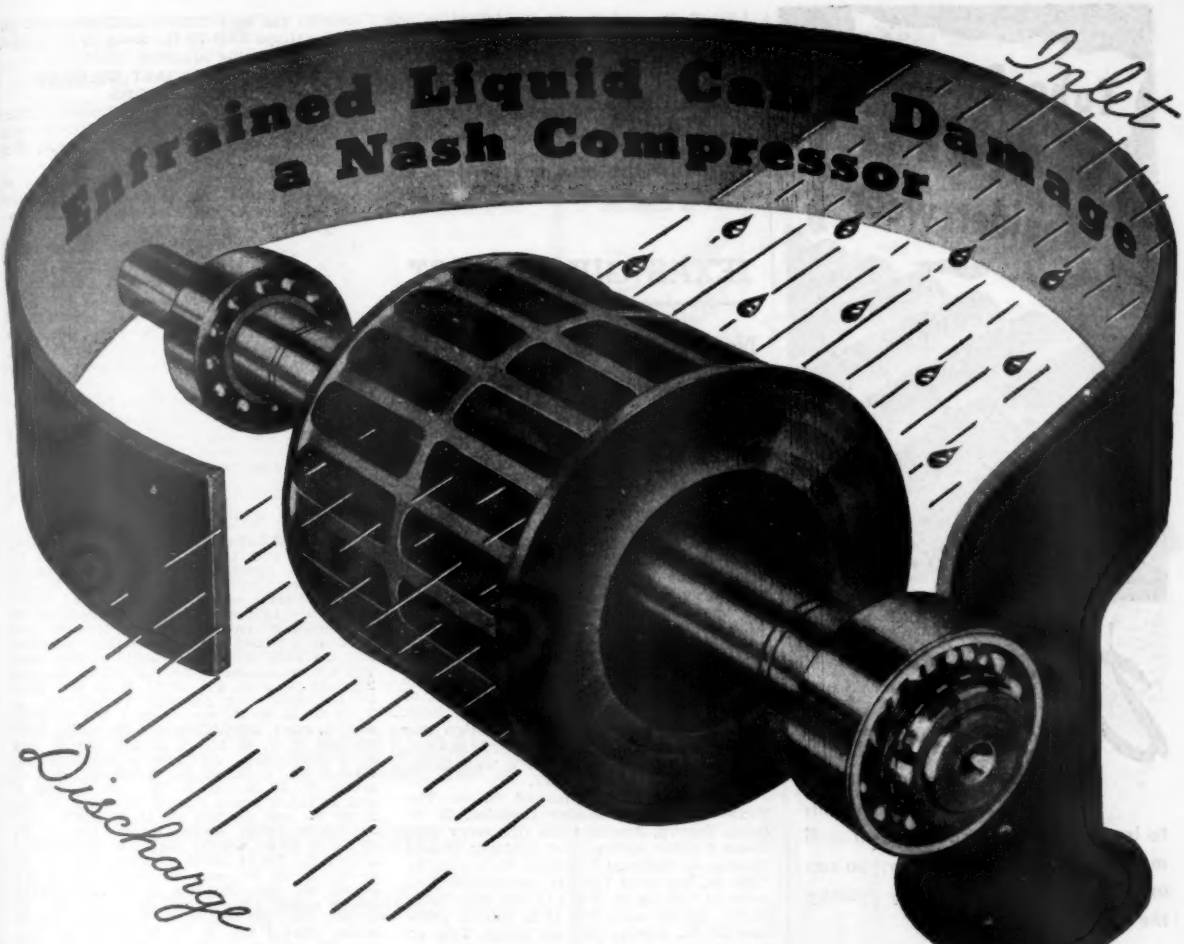
South Penn Relaxes Oil-Sale Restrictions

PITTSBURGH.—The South Penn Oil Co., largest producer and marketer of Penn Grade crude, announced that for the month of February, sales to refineries will be 65 per cent of the rateable, an increase from 60 per cent which prevailed in January. Oil production is increasing from the low point of December but remains considerably under normal.

In Mercer County, Pennsylvania, United Natural Gas Co. halted drilling at 1 Maude Davidson, Worth Township, at 8,893 ft., set a packer at 8,375 ft. and will acidize the gas showings in the Trenton lime. Gas gaged 50,000 cu. ft. at 8,200 ft. and 118,000 cu. ft. at 8,582 ft.

In Wood County, West Virginia, South Penn Oil Co. topped the Corniferous lime at 5,014 ft. in the R. P. Ingram wildcat, Union district, and shut down at 5,034 ft. to run casing before drilling into the Oriskany sand.

In Ravenswood district, Jackson County, United Carbon Co. is pulling casing to deepen the Salt sand well which came in with a gage of 933,000 cu. ft. of gas



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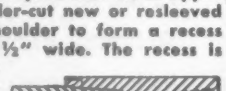

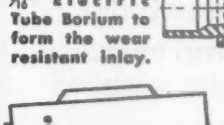

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1,594-97 ft., and it will be drilled to the Oriskany.

In Lincoln County, United Fuel Gas Co. completed 5,403 Mohler Lumber Co. in the Washington district, from Big lime with an open flow of 6,363,000 cu. ft. from a total depth of 1,737 ft.

In Calhoun County, Hope Natural Gas Co. completed 8,924 Arthur Offutt in Washington district as an Injun sand gas well gaging 1,961,000 cu. ft. from total depth of 2,223 ft.

TEXAS GULF COAST

New Condensate Field For Colorado County

HOUSTON.—Pan American Production Co. 1 R. L. Williams, in CTRR Survey 663, has opened a new field for Colorado County, flowing gas-condensate from perforations at 8,368-90 ft. This new discovery opens the West Orange Hill field. Total depth is 9,250 ft. with 5½-in. casing set at 8,977 ft. On drill-stem test made through perforations 8,381-90 ft. the well flowed gas-condensate. Tool was pulled and more perforations made from 8,368-81 ft. to take in the entire section from 8,368-90 ft. It flowed into pits 8 hours through ⅛-in. choke, tubing pressure 2,275 lb., no gage, and is now shut in to erect separators and to build storage tanks. This well is 11,900 ft. northeast of nearest production at the Ramsey field. Pan American has staked location for their 1-B August Schindler, 2,448.4 ft. northeast from the discovery well in A. Becker Survey, Abstract 97.

Potential has been turned in on The Texas Co. 1 Mrs. Madge Hopkins, R. H. Davis Survey, Abstract 225, discovery well about 3 miles northeast of Addicks, Harris County, as follows: TD 8,015 ft., 5½-in. at 7,761 ft., top sand 7,703 ft., perforations 42 holes at 7,702-08 ft., PT 4.13 bbl. day ¼-in. choke, gas-oil ratio 600 to 1, tubing pressure 25 lb., gravity 45°, no water, 2-in. at 7,672 ft. Pump will be installed.

Atlantic Refining Co. 1 Houston-American, wildcat, Section 3, BBB&C Survey, Tyler County, is still testing. Several tests have been run in the 8,400-ft. sand, one at 8,432-60 ft. recovering 900 ft. oil and 1,035 ft. brackish water; latest test was in perforations 8,390-95 ft. where it showed 1,900 lb. maximum working pressure in 22 minutes, using ¼-in. top and bottom chokes, flowing water, gas and oil. These perforations are being squeezed to test higher. Total depth is 9,015 ft., with 5½-in. set at 8,675 ft.

Navarro Oil Co. 1 Foster Lumber Co. in George Taylor Survey, south of Spring, in San Jacinto County, is coring ahead below 7,912 ft. after recovering oil on two drill-stem tests in Wilcox sand just above this depth. First drill-stem test was run 7,900-07 ft., using ¼-in. chokes top and bottom, showed 275 lb. working pressure and recovered 360 ft. of oil, 180 ft. of oil-cut mud, 1,540 ft. water cushion and no salt water. It was then cored five feet deeper into the sand to 7,912 ft. and second drill-stem test was run 7,905-12 ft., using ¼-in. chokes top and bottom. The seat failed in 13 minutes but it showed 970 lb. working pressure and recovery was 450 ft. pipe-line oil, 280 ft. oil-cut mud and 17 stands of water cushion.

A second producer for the Spring field of Harris County is indicated at ElTex, Ltd. 3 Bender estate, southwesterly offset to the 1 Bender estate, discovery well and only producer so far in the field. The number 3 test topped Cockfield sand at 6,235 ft., found 4 feet of gas cap, then cored 10 ft. of oil sand to total depth 6,249 ft.

Stewarts 1 A. E. Westhoff et al, wildcat, 1½ miles southeast of Edna, in the Joseph Rector Survey, Jackson County, showed gas on 7-minute drill-stem test on perforations 5,431-39 ft., using ¼-in. choke, 1,500 lb. working pressure.

UPPER GULF COAST WILDCAT COMPLETIONS

Chambers County: Jack W. Frazier 1 Elizabeth H. Moore estate, T&NO Survey 266, 8 miles northwest of Winnie, dry at 9,002 ft.

Chambers County: Rowan Drilling et al 1 Royalty Corp. of Beaumont, Henry Burt Survey, 6½ miles south of Anahuac, dry at 9,300 ft.

Harris County: Texas 1 Mrs. Madge Hopkins, discovery, Addicks area, R. H. Davis Survey, 3 miles northeast of Addicks, top sand 7,703 ft., TD 8,014 ft., 5½-in. casing at 7,761 ft., perforated 7,702-08 ft., PT 4.13 bbl. per day through ¼-in. choke, gas-oil ratio 600, tubing pressure 25 lb., gravity 45°, no water.

Matagorda County: Atlantic 3-C Denman-Kountze, West Markham, discovery, Henry Parker Survey, Lot 12, TD 5,311 ft., 5½-in. casing at 5,190 ft., perforations 4,865-78 ft., PT 4,000,000 cu. ft.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, General Land Office, Washington, D. C. Notice is hereby given that the lands herein described within the Black Mountain Anticline oil field, 6th P. M., Wyoming, are offered to qualified bidders of the highest cash amounts offered per acre as a bonus for the privilege of leasing the land under section 17 of the leasing act, as amended by the act of August 21, 1935 (45 Stat. 674, 30 U. S. C. sec. 226), in the following parcels: Parcel No. 1, T. 42 N., R. 90 W., sec. 5, lot 4, SW¼NW¼; sec. 6, lot 1, SE¼NE¼; 160.69 acres. Parcel No. 2, T. 42 N., R. 90 W., sec. 6, lots 2, 3, SW¼NE¼, SE¼NW¼, 160.38 acres. Parcel No. 3, T. 42 N., R. 90 W., sec. 6, lot 4; T. 42 N., R. 91 W., sec. 1, lots 1 and 2; 117.18 acres, Parcel No. 4, T. 43 N., R. 90 W., sec. 31, lots 10, 11, N½SE¼, sec. 32, lot 4, 196.31 acres. Parcel No. 5, T. 43 N., R. 90 W., sec. 31, lots 5, 6, SW¼NE¼, E½NW¼, 218.84 acres. Parcel No. 6, T. 43 N., R. 90 W., sec. 30, lot 8; T. 43 N., R. 91 W., sec. 25, lots 3, 4, NW¼SE¼; 168.96 acres. Parcel No. 7, T. 43 N., R. 91 W., sec. 25, lots 1, 2, N½SW¼, 158.72 acres. Parcel No. 8, T. 43 N., R. 91 W., sec. 26, lots 3, 5, Tracts 42M and 42-N, SW¼SE¼, 163 acres. Parcel No. 9, T. 43 N., R. 91 W., sec. 26, lot 4, W½SW¼, SE¼SW¼, sec. 27, lot 8, Tract 41-O, sec. 35, N½N½N½N½NW¼, 204.01 acres. Parcel No. 10, T. 43 N., R. 91 W., sec. 35, lots 1, 2, 3, 4, 153.71 acres. Parcel No. 11, T. 43 N., R. 91 W., sec. 35, S½NW¼, NE¼SW¼, NW¼SE¼, 160 acres. The minimum bid which will be accepted is $1 per acre. Sealed bids will be received in the office of the Commissioner of the General Land Office, Interior Department Building, Washington 25, D. C. up to 12 noon February 20, 1945. Bids must be submitted on each parcel separately but if two or more parcels are awarded to the same bidder they may be included in a single lease provided the aggregate acreage does not exceed 640 acres. Each bidder must submit a certified check or cash for one fifth of the amount bid, payable to the order of the Treasurer of the United States, and file the showing of qualifications to receive a lease required by section 7 of Circular 1386. The remainder of the bonus bid and the first year's rental at the rate of $1 per acre must be paid and a $5,000 corporate surety bond must be filed by the successful bidders prior to the issuance of the leases. The deposits of the other bidders will be returned. The envelopes should be plainly marked "Bid for Parcel No. . . . , Black Mountain Anticline oil field, Wyoming. Not to be opened before noon February 20, 1945." No bids received after the date fixed herein for submitting bids will be considered. The successful bidder will be required to agree not to discriminate against any employee or applicant for employment because of race, creed, color, or national origin, and to require an identical provision to be included in all subcontracts. Bidders are warned against violation of section 59, U. S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids in the discretion of the Secretary of the Interior. Fred W. Johnson, Commissioner.

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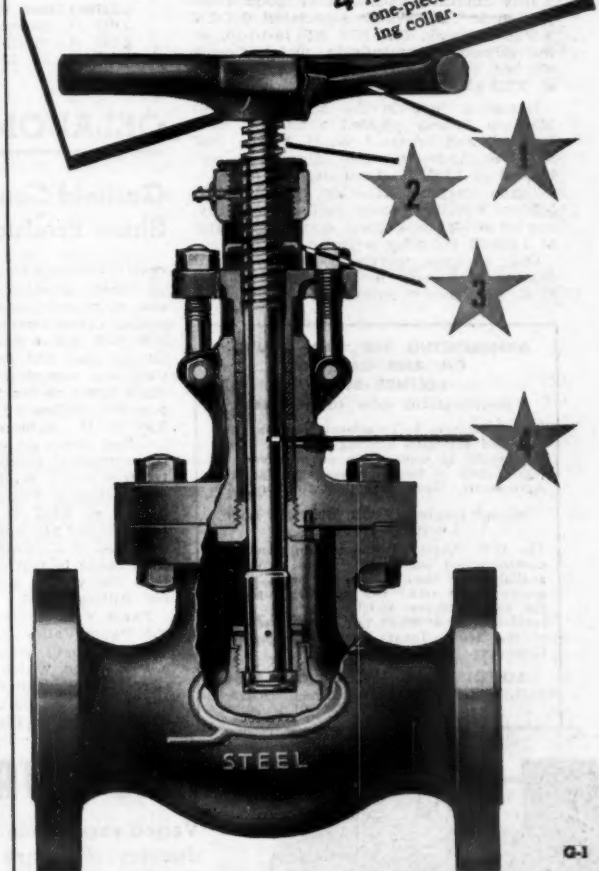

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gas and 4 bbl. water-white condensate per day through ¾-in. choke, gas-oil ratio 1,000,000 to 1, tubing pressure 2,600 lb., casing pressure 1,885 lb., gravity 37.3°.

ILLINOIS

Good Wells in Bennington, Woodlawn and E. Olney

CENTRALIA.—Thirty oil wells with total initial production of 3,656 bbl. of oil, an average of 122 bbl. per well, were completed during the week in Illinois, together with nine dry holes.

In the new Olney East pool, in Richland County, Gulf Refining Co. 1 J. Schrey, NE SE NE 23-4n-10e, pumped 432 bbl. of oil and 14 bbl. of water from McClosky lime at 3,085-94 ft., total depth 3,101 ft. It is two locations west of the discovery well which started at 416 bbl. per day from McClosky lime.

The Bennington pool in Wayne and Edwards counties had another good completion in Tide Water Associated Oil Co. 3 Van Schoeck, NW NW NE 18-1n-10, on the Edwards County side, which flowed 430 bbl. in 24 hours from McClosky lime at 3,222-40 ft., which had been acidized.

Devonian lime in the Marine pool in Madison County yielded a 250-bbl. well, Rockhill and others 4 W. H. Pierce, NW SE SW 10-4n-6w. The Devonian was topped at 1,727 ft., total depth 1,769 ft.

Texas Co. 1 J. Schmidt, NW SW NW 1-3s-1e, Woodlawn pool, Jefferson County, started at 335 bbl. from Aux Vases sand at 1,960-88 ft., after a shot.

Only 22 new operations were reported during the week including 5 wildcats: J. E. Heavener 1 Brodhead, 330 ft. from south and 419 ft. from east lines SE SW SE 14-5n-5w, 4th p.m., Hancock County; Aetna and R. F. Hayes 1 Greathouse, SW NE NW 23-1n-10e, Edwards County; Pure Oil 1 Staley, SE SE NW 23-2n-7e, Wayne County; Pure 1 A. A. Smith-A, SE SE SE 17-1s-7e, Wayne County, and O. R. Florum 1 March, SW SE NE 35-1n-2e, Marion County.

ILLINOIS WILDCAT COMPLETIONS

Clay County: Texas 1 W. Jones, SE SE NW 18-5n-5e, McClosky lime 2,498-2,505 ft. Pumped 12 bbl.

Jefferson County: Oil Management 1 Hail, NW SW NE 29-1s-1e, dry at 2,357 ft. Glen Dean 1,653 ft., Barlow lime 1,856 ft., Benoist sand 2,020 ft., Aux Vases 2,090 ft., Fredonia 2,261 ft.

Lawrence County: Big Chief 1 Fiscus, NW NW SW 32-3n-13w, dry at 2,897 ft. Glen Dean 2,324 ft., Cypress 2,566 ft., Weiler 2,610 ft., Ste. Genevieve 2,820 ft., McClosky 2,868 ft.

Madison County: T. T. Eason 1 R. Frey, SW SE NW 23-3n-6w, dry at 1,912 ft. No log.

Montgomery County: W. Vette 1 William Hordt, SW SW NW 27-9n-5w, dry at 695 ft. No log.

Richland County: Kingwood 1 G. Klinger, NW NE NW 31-5n-9e, dry at 3,179 ft. Lower Glen Dean 2,486 ft., Cypress 2,681 ft., Benoist 2,921 ft., Aux Vases 2,941 ft., McClosky 3,071 ft., dolomite 3,103 ft., St. Louis 3,140 ft.

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OKLAHOMA

Garfield County Outposts Show Production

TWO Garfield County wildcats last week drew attention from West Edmond and other outstanding new areas in Oklahoma, Cities Service Oil Co. 1 Mariner, NW NE NW 6-22n-3w, northeast of the Garber pool and southwest of the Billings pool was completed after it had flowed for 2 hours at the rate of about 2,300 bbl. per day, following an acid treatment at 5,247-97 ft., Arbuckle lime. It was then pinched down to 10 bbl. per hour. The other wildcat producer was Con-Tex Petroleum Co. 1 Wolf, SE SE SW 34-24-2w, which topped Wilcox sand at 4,838 ft., bottomed at 4,843 ft., and in a drill-stem test showed gas and 450 ft. of oil and oil-cut mud in 7 minutes. Preparations were then made to run casing for a production test. The well is 3 miles southwest of the old Billings pool.

Pauls Valley.—The Texas Co. extended the Pauls Valley pool in Garvin County ½ mile north with 1 Trahern, SE NW NW 32-4n-1e, which produced 140 bbl. the first hour and then 118 bbl. and 97 bbl. the succeeding hours from basal Pennsylvania sands through perforations at 4,098-4,108 ft. and 3,988-4,011 ft., total depth 4,702 ft. After the third hour it was choked down and produced 1,560 bbl. in 24 hours. In the East Pauls Valley pool Ohio Oil Co. 1 Lewis-Wacker, SW SE NW 18-3n-2e, flowed 1,080 bbl. of oil and 1,000,000 cu. ft. of gas in 24 hours from the Burns sand at 2,946-72 ft. and Bromide topped at 3,000 ft., total depth 3,050 ft. A number of smaller producers were completed in the Pauls Valley area during the week.

West Edmond.—At the close of January there were 361 oil wells in the West Edmond field, 22 wells waiting on cement before testing, 85 wells drilling or rigged up, 33 derricks up, and 25 locations made. Twelve dry holes had been drilled in efforts to extend the field, which lies mainly in Oklahoma County but sprawls over into Canadian, Kingfisher and Logan counties. Sohio Oil Co., with 86, leads in number of producing wells, Phillips Petroleum Co. is second with 58 wells.

The Corporation Commission of Oklahoma allotted an allowable production of 56,250 bbl. in February and 63,750 bbl. per day in March to the West Edmond field.

A half dozen new wells were added to West Edmond during the week in review, all of them large potential producers. Phillips Petroleum Co. and Peppers Gasoline Co. each had several wells in the near completion stage. A near edge well in the southern end of the field was completed as a 500-bbl. well. It was Cities Service 1 Stenchcomb-A, C NE SW 28-13n-4w, producing from Hunton at 6,898-7,008 ft. It had not been acidized.

Stanolind Oil and Gas Co. 1 Lowenstein, NE SW 17-13n-4w, had Hunton at 7,025 ft., base of the Bois D'Arc at 7,134 ft., Chimney Hill at 7,213 ft., Sylvan at 7,391 ft., total depth 7,400 ft. It was plugged back to 7,142 ft. and acidized through perforations at 7,120-40 ft. It flowed 1,000 bbl. of fluid, 90 per cent salt water.

OKLAHOMA WILDCAT COMPLETIONS

Alfalfa County: Gutowski & Acre 1 Young, NW NW 14-24n-11w, dry, TD 5,755 ft., Oswego 5,662 ft.

Garvin County: Skelly & Tidewater 1 Rakestraw, SE SW SE 4-4n-3e, pumped 76 bbl. in 3 hours from Pennsylvanian sandy shale at 2,490-2,500 ft., TD 3,547 ft., gravity of oil 38°, Bromite dense 3,185 ft.

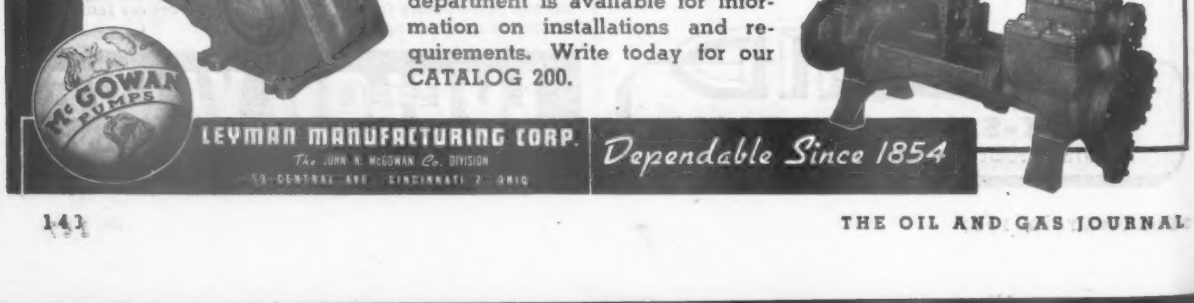
Grady County: Olson Drilling 1 Johnson heirs, NW SE 35-6n-8w, dry, TD 6,184 ft.

Hughes County: Northern Ordnance 1 Empire, SW SW NE 4-5n-11e, dry, TD 5,724 ft., Cromwell 5,234 ft.

Love County: Magnolia 1 Noah-Williams, SW SE 6-6s-3w, dry, TD 8,290 ft., Arbuckle 7,787 ft.

Oklahoma County: Fox & Fox 1 Luston, SW NW NW 6-13n-2w, dry, TD 6,783 ft., Hunton 6,113 ft., Sylvan 6,312 ft.

Seminole County: Northern Ordnance 1 Sowanoke, SW NW SW 1-5n-6e, dry, TD 2,470 ft., Cromwell 2,400 ft.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OHIO, KENTUCKY

Gas Discovery Indicated For Portage County

COLUMBUS.—The first commercial well in Portage County seems assured at Roy Weed 1 Melvin Roberts, Lot 11, Aurora Township, 12 miles from the nearest production. Red Clinton at 3,867-3,930 ft. gaged 164,000 cu. ft. of gas and 2 days after shot was flowing steadily at the rate of 430,000 cu. ft. daily through casings.

Frank Lyons found a show of oil and gas in his Tuscarawas County wildcat. Oriskany sand was found at 3,468-79 ft. The well will be shot and tested.

Industrial Gas Co. 1 Mary Murphy, Section 28, Salt Creek Township, Muskingum County, made 46 bbl. from the Medina sand at 4,251-56 ft., and extends the pool ½ mile to the north. Three additional wells are drilling in the pool.

OHIO WILDCAT COMPLETIONS

Harrison County, Stock Township: Texas Co. 1 E. A. Mizer, Sec. 32, Clinton 6,063-6,156 ft., dry, Medina 6,181-6,199 ft., dry, TD 6,301 ft.

WESTERN KENTUCKY

OWENSBORO.—Carter Oil Co. may have extended the St. Vincent pool, in Union County, Kentucky, ½ mile north with 3 Drury, 1-O-20, 4 miles northeast of Morganfield. A drill-stem test of McClosky lime at 2,541-51 and 2,556-63 ft. resulted in a flow of oil in 35 minutes. The crew was changing over to cable tools for a completion test.

Sun Oil Co. 10 Highland Creek Coal, 16-P-20, Uniontown pool, Union County, is a 100-bbl. completion in Waltersburg and Tar Springs sands at 1,835-71 ft. and 1,928-39 ft.

The Texas Co. completed a deep dry hole in Grayson County, 1 M. E. Allen, 9-M-36, 1½ miles north of Junction Hill.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, General Land Office, Washington, D. C. Notice is hereby given that the SE¼SW¼ sec. 5, T. 17 S., R. 32 E., N.M.P.M., New Mexico, 40 acres within the known geologic structure of the Mitchell oil field is offered as a single parcel to the responsible qualified bidder of the highest cash bonus per acre for lease under section 17 of the mineral leasing act, as amended by the act of August 21, 1935 (49 Stat. 674, 30 U.S.C. sec. 226). Sealed bids will be received in the office of the Commissioner of the General Land Office, Interior Building, Washington 25, D. C., up to twelve noon February 27, 1945. Each bidder must submit a certified check or cash for one-fifth of the amount bid payable to the order of the Treasurer of the United States and file the showing of qualifications to receive a lease required by section 7 of Circular 1386. The remainder of the bonus bid and the annual rental at the rate of $1 per acre must be paid, and a $5,000 corporate surety bond must be furnished by the successful bidder prior to the issuance of the lease. The deposits of the other bidders will be returned upon acceptance of the successful bid by the Secretary of the Interior. The envelopes should be plainly marked "Bid for lease, Mitchell oil field, New Mexico. Not to be opened before noon February 27, 1945." No bids received after the hour fixed herein for submitting bids will be considered. The successful bidder will be required to agree not to discriminate against any employee or applicant for employment because of race, creed, color, or national origin and to require an identical provision to be included in all subcontracts. Bidders are warned against violation of section 59, U. S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids in the discretion of the Secretary of the Interior. Fred W. Johnson, Commissioner.

WILDCAT COMPLETIONS AND DISCOVERIES

	Week ended Feb. 3, 1945					Cumulative total, 1945				
	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
Ohio	0	0	0	1	1	0	0	0	5	5
Indiana	0	0	0	0	0	0	0	0	0	0
Illinois	1	0	0	4	5	6	0	0	32	38
Kentucky	0	0	1	1	2	1	0	1	6	8
Michigan	0	0	0	4	4	0	0	0	21	21
Kansas	3	0	0	9	12	4	0	2	44	50
Neb., Mo., Iowa	0	0	0	0	0	0	0	0	5	5
Oklahoma	2	0	0	6	8	8	0	1	29	38
Texas:										
North Central	1	0	0	6	7	9	0	1	33	43
West	0	0	0	6	6	3	0	0	23	26
Panhandle	0	0	0	0	0	0	0	0	0	0
Eastern	0	0	0	1	1	3	0	0	5	8
Gulf Coast	3	0	3	6	12	6	0	6	30	42
Southwest	0	0	0	2	2	2	0	1	22	25
Total Texas	4	0	3	21	28	23	0	8	113	144
Louisiana:										
Northern	0	0	0	1	1	0	0	0	9	9
Southern	0	0	0	0	0	2	0	0	5	7
Total Louisiana	0	0	0	1	1	2	0	0	14	16
Arkansas	0	0	0	1	1	0	0	0	6	6
Mississippi	1	0	0	0	1	1	0	0	9	10
Ala., Ga., Florida	0	0	0	0	0	0	0	0	2	2
Montana	0	0	0	1	1	2	0	0	2	4
Wyoming	1	0	0	0	1	4	0	0	3	7
Colorado-Utah	0	0	0	0	0	0	0	0	2	2
New Mexico	0	0	0	1	1	2	0	0	6	8
California	0	0	0	3	3	0	0	1	22	23
Total United States	12	0	4	53	69	53	0	12	321	387
Total previous week	10	0	3	54	67					

Trenton lime was topped at 2,810 ft., total depth 3,135 ft.

A. J. Slagter 2 Durban, 3-L-21, 2 miles south of Calhoun, McLean County, was dry at 1,300 ft.

WESTERN KENTUCKY WILDCAT COMPLETION

Henderson County: Ashland Refining and Basin Drilling 1 R. C. Gaines, 14-P-21, 2 mi. S of Smith Mills, was plugged at 2,799 ft., after a hopeless fishing job for 1,850 ft. of 5½-in. casing. Another test may be started to explore Tar Springs sand at 1,941-60 ft., which showed for a 25-bbl. well in 1 Gaines.

INDIANA

EVANSVILLE.—The only completed well reported in Indiana last week was Farm Bureau and Rossi 1 Robert Gibson, NE NE NW 27-4s-12w, which was dry at 2,794 ft. Dry dolomite breaks were penetrated at 2,726-34 and 2,767-74 ft.

LA.-ARK.

Holly Ridge Pool Gets Two New Producers

SHREVEPORT.—Two new oil wells were completed this week in the Holly Ridge pool of Tensas Parish. Stanolind Oil & Gas Co. 2 Shelley, NE NE 30-11n-10e, was completed for 384 bbl. per day from Massive sand at 8,360-80 ft. Magnolia Petroleum Co. 4-B Shelley, approximately NW NW SW 29-11n-10e, made 290 bbl. per day from the Massive sand at 8,368-88 ft. Lake St. John pool in Concordia Parish gained another producer with the completion of California Co. 2 Pan American - McKinney Commission, 1,208 ft. south and 4,690 ft. east of the northeast corner of Section 15 in Section 6-9n-10e. The well was completed for 320 bbl. from the Massive sand at 9,110-42 ft.

One dry wildcat was completed in West Carroll Parish. It was Arkansas Fuel Oil 1 Briggs, NW NW 9-21n-11e, which was carried to 6,937 ft.

In Arkansas, a wildcat test in Ouachita County shows promise of being an oil well. G. H. Vaughn 1 Halton, NE NE SE 28-15s-18w, northwest of the Holly pool, swabbed 40 bbl. oil per day, until salt water encroached. Operators squeezed perforations, perforated at 2,474-80 ft. with 35 shots, and will continue testing.

ARKANSAS WILDCAT COMPLETION

Nevada County: Big West Drilling 1 Mendenhall, NW NW NW 1-14s-20w, dry, TD 4,795 ft., James 2,325 ft.

NORTH LOUISIANA WILDCAT COMPLETION

West Carroll Parish: Arkansas Fuel Oil 1 Briggs, NW NW 9-21n-11e, dry, TD 6,937 ft.

MISSISSIPPI

Black Oil Recovery In Jasper County Test

JACKSON.—Gulf Refining Co. 1 Edwards-Bailey unit, approximately NE NW SE 27-10n-13w, in the Soso area of Jasper County, has recovered 1,425 ft. of heavy black oil and 3,325 ft. of salt water in a 1½-hour drill-stem test of the Massive sand zone. After an unsuccessful drill-stem test from 7,828-34 ft., recovering only salt water and mud, perforations were squeezed, and the second test was made without additional perforations. The test tool was run with ¾-in. bottom choke and ¼-in. top choke. Tops on this test are Eutaw 6,232 ft., First sand 6,240 ft., Stanley 6,391 ft., Christmas 6,590 ft., Tuscaloosa 6,696 ft., Marine Tuscaloosa 7,490 ft., Davis sand zone 7,654 ft., Massive sand 7,734 ft.

The Superior Oil Co. has extended the gas production of the Baxterville field about 1½ miles southeast with their 1 Batson, approximately NW NE SW 17-1n-16w, in Lamar County.

MISSISSIPPI WILDCAT COMPLETIONS

Clarke County: Kirby Petroleum 1 Long Bell Petroleum, NW NW SW 30-1n-18e, pumped 156 bbl. of 18.1° gravity oil from pay zone 3,729-39 ft., TD 3,892 ft., Eutaw 3,647 ft., Tuscaloosa 4,043 ft., Marine Tuscaloosa 4,743 ft., Massive 5,065 ft.

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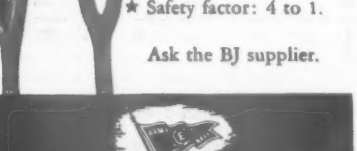

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Among the Drilling Contractors

Edminston Drilling Co., Evansville, Ind., has contracted to drill a wildcat test for F. H. Rhodes in 30-7s-7w, Spencer County, Indiana.

Major Oil Drillers of Calgary resumed work on a contract for completion of Wesreserve Oils 1, LSD 7, 36-28-4w5, on the Milburn Creek structure in the Alberta foothills. Drilling is proceeding below 5,059 ft., with a deep test indicated.

Newell & Chandler of Calgary are completing Conrad-Province 55-33-B, LSD 11, 33-5-15w4, in the Conrad field, southern Alberta. Production from the Ellis at 3,084 ft. is indicated on initial tests.

B. & M. Drilling Co. has been organized with offices in Los Angeles to engage in contract drilling in California fields. Copartners are H. M. Brunwin and Robert S. McKeon. The concern's first undertaking is Atha Exploration Co.'s new well at Huntington Beach.

Southern California Drilling Co. has filed a certificate of dissolution in Los Angeles County, California.

Crawford & Hiles, California drilling contractors, have been awarded contracts for two new wells to be drilled for Long Beach Development Co. in the Wilmington field, California. These contractors are already running three strings of tools at Wilmington.

Lupher Drilling Co. has been awarded contracts to drill three wells in Isabella County, Michigan, for Sohio Petroleum Co. The wells are the A-2 R. O. Dague, in N½ NW SW 29-16n-6w; the A-3 R. O. Dague, in N½ NW NW 32-16n-6w, and the B-1 Buelah M. Durkee, in N½ SE NW 32-16n-6w.

R. & S. Drilling Co. will drill on contract the Dow Chemical Co. 20 Fent-Worth, in C SE 23-18n-8w, Osceola County, Michigan.

Kiowa Drilling Co. is the contractor on the Boundy & Thayer Co. et al 1-C Soderstrom, in SE NE NW 21-17s-13w, in the Hoisington pool, Barton County, Kansas, which encountered top of Arbuckle lime at 3,445 ft. and drilled to 3,462 ft. with saturation from 3,460-62 ft.

Robert W. Atha, drilling contractor, has placed a new rotary drilling rig in operation in the Wise field, Michigan, for Gulf Refining Co.

Merrill Drilling Co. will drill the Lowell Bernhardt and J. V. Wicklund 1 Mutch, wildcat in Arenac County, Michigan.

Arch Newland, drilling contractor, is waiting to move in drilling tools

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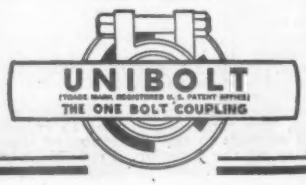

to south of Lucerne, in Putnam County, Missouri, to drill an Arbuckle lime test for Dan McLaughlin.

Fred Morgan has been awarded contract by W. E. Anderson, of Muskegon, Mich., to drill the 1 O'Neill, location for which has been staked in SE SE SE 11-19-4w, east of the Marshall pool of northwestern Logan County, Oklahoma. It will be a 5,000-ft. test to the Layton sand. Gulf Oil Corp. is supporting the test.

Tom Benson has the contract to drill the Ohio Oil Co. 1 Woodward-Walker, in SE 31-17-7w, Bienville Parish, Louisiana, southwest of the Sailes townsite. The contract is for 7,000 ft., and contractors were moving in.

Penrod Drilling Co. is the contractor on the Kirby Petroleum Co. A-2 Long Bell Lumber Co., in NE NE NE 25-1n-17e, Clarke County, Mississippi. Steam rig has been moved from Gilbertown, Ala.

Kerlyn Oil Co. has the drilling contract on the Phillips Petroleum Co. and associates 1 Burnett, in SE SE NW 19-6n-1e, wildcat in southern Cleveland County, Oklahoma. Others in the deal are Anderson-Prichard Oil Corp., Mid-Continent Petroleum Corp., and Kerlyn.

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MARKET QUOTATIONS

Prices as of February 6, 1945

REFINERY GASOLINE

Octane (A.S.T.M.)	76†	70-74
Mid-Continent*	6.75	5.875
Gulf Coast	6.75	5.625
Northeast Coast	...	9.075
California	...	6.50-7.00

*Basic Oklahoma Group 3. †1939 C.F.R. (research method).

NATURAL GASOLINE

Grades:	26-70	18-55
Oklahoma (Group 3)	4.750	5.700
North Texas (Dist. 1 Del.)	4.500	5.400
North Texas (f.o.b. plant)	4.375	5.250
North Louisiana (Dist. 1 Del.)	5.160	6.060
North Louisiana (f.o.b. plant)	4.375	5.250
California	4.875	5.500

CRUDE-OIL PRICES

Representative posted schedules per bbl.	
East Texas	$1.25
Conroe	1.43
Tepetate, Louisiana	1.18
Illinois basin	1.37
Pecos County, Texas	.95
Bradford, Pennsylvania	3.00
Van, Van Zandt County, Texas	1.08

CORRECTION. — Posted price for Van field crude is $1.08 per barrel, unchanged since May 21, 1941. Published price on Van crude in the Journal of $1 per barrel since December 9 was a typographical error perpetuated until now.

Note: Exclusive of subsidy.

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity.	Signal Hill, Calif.	Oklahoma Kansas	Gulf Coast Texas	West Texas
18-18.9	$0.80	....	....	....
19-19.9	.84	....	$1.06	$0.70
20-20.9	.88	$0.85	1.08	.72
21-21.9	.92	.87	1.10	.74
22-22.9	.96	.89	1.12	.76
23-23.9	1.00	.91	1.14	.78
24-24.9	1.03	.93	1.16	.80
25-25.9	1.07	.95	1.18	.82
26-26.9	1.11	.97	1.20	.84
27-27.9	1.15	.99	1.22	.86
28-28.9	1.18	1.01	1.24	.88
29-29.9	1.20	1.03	1.26	.90
30-30.9	1.23	1.05	1.28	.92
31-31.9	....	1.07	1.30	.94
32-32.9	....	1.09	1.32	.96
33-33.9	....	1.11	1.34	.98
34-34.9	....	1.13	1.36	1.00
35-35.9	....	1.15	1.38	1.02
36-36.9	....	1.17	1.40	1.04
37-37.9	....	1.19	1.42	1.06
38-38.9	....	1.21	1.44	1.08
39-39.9	....	1.23	1.46	1.10
40 and above	....	1.25	1.48	1.12

*Includes Lea County, New Mexico.

A.P.I. REFINERY REPORT

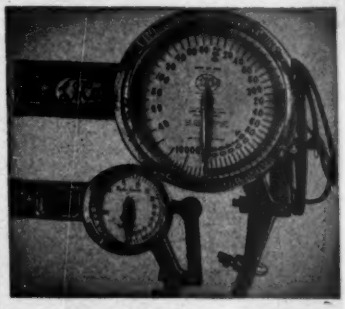
Week ended January 27, 1945

(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks: Gasoline*	Distillate	Residual
East Coast	774	12,248	6,955	4,951
Appalachian	162	4,360	656	520
Ill., Ind., Ky.	799	20,480	4,925	2,693
Okla., Kan., Mo.	395	9,078	1,949	1,278
Inland Texas	225	2,747	384	661
Tex. Gulf Coast	1,123	15,509	6,817	8,848
La. Gulf Coast	289	4,503	1,276	1,336
N. La., Ark.	76	2,756	842	259
Rocky Mtn.	128	1,877	360	578
California	785	15,665	9,487	29,995
Total 1-27-45	4,756	89,223	33,651	51,119
Total 1-20-45	4,686	88,708	35,041	52,554
Total 1-29-44	4,364	80,917	37,251	52,980

*Military 42,811; civilian 46,412.

20 LINE SCALES to choose from



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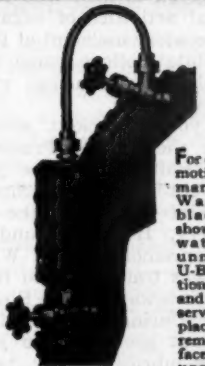
WATER GAGE SET



For oil field, locomotive type and marine boilers. Water shows black — steam shows white; the water level is unmistakable. U-Bolt construction is strongest and simplest to service. Glass replaced by simply removing nuts on face of gage . . . unnecessary to work between gage and boiler. Conforms with A.S.M.E., Federal and State requirements when used for pressures specified by their respective codes.

This is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

PERSONALS

Refineries Manager Once Worked as Sugar Tramp

JOHN W. DUCKETT, recently advanced to refineries manager for Sinclair Refining Co., didn't make a flying leap into the oil business. After majoring in chemistry at University of Maryland and graduating in 1910, he taught school in Puerto Rico. Becoming interested in the sugar industry, he got a job in a sugar laboratory. He followed that work 3 years in New Orleans, Puerto Rico and Cuba, becoming what is called in the trade a "sugar tramp," the name given to men who follow the seasonal activities of sugar refining. Laboratory assistant at Pennsylvania State College came next, then chemist in a Chicago stockyard.

In 1915 young Duckett went to work as a chemist for Prudential Oil Co. in Baltimore. Three years later he went to East Chicago as assistant chief chemist in the Sinclair refinery. He had found his niche. Advancements came. Within a year he was transferred to Houston as superintendent of the Sinclair plant there. During his administration the plant grew from a small one, making lubricants only, to the company's largest, handling all kinds of crude oil for all types of products. In 1930 Duckett was sent to New York, where he was made assistant manager of refineries, which post he held until he was promoted to refineries manager.

Rulon W. McOmie has been appointed refinery superintendent for Shell Oil Co., Inc., at Wilmington, Calif. **Loilor J. Snyder** has been transferred from the company's Martinez refinery to Wilmington as manager of the catalytic-cracking department. **Emil A. Romer** has been appointed refinery superintendent at Martinez and **Louis Goldsmith** assistant. **Don Davis** succeeds Snyder as manager of the cracking department at Martinez. **Clyde H. Britten,** who was assistant manager at Wilmington, is now manager of the technical applications committee at the head office in San Francisco.

Philip G. Wharton, general auditor of The Atlantic Refining Co. since 1935, has been elected a vice president and will have charge of certain administrative functions. **J. P. Miller, Jr.,** was named general auditor to succeed Wharton.

© Bachrach

Dr. Paul Hugh Emmett, a chemist who has distinguished himself by his researches on catalysis, has joined the Mellon Institute staff. He was engaged in studies on catalysis at the Fixed Nitrogen Laboratory of the U. S. Department of Agriculture, Washington, from 1926 to 1937, and during that period served as lecturer on catalysis at George Washington University. From 1937 until his appointment at Mellon Institute he was professor of chemical and gas engineering at Johns Hopkins University. He is also an associte editor of the Journal of the American Chemical Society. At Mellon Institute he will plan and supervise long-range investigational projects on catalysis of importance in petroleum technology.

E. H. Collins, manager and vice president of Standard Oil Co. of Pennsylvania, has been named assistant to **L. E. Ulrope,** region manager in charge of northern divisions.

R. E. Stearns has been promoted by Humble Oil & Refining Co. to district superintendent of the London district, Overton, Tex., and **C. M. Vardaman** to district superintendent of the Talco, Tex., district.

Lt. Col. William B. Plummer, relieved from active duty with the Army Air Forces, has returned to Standard Oil Co. of Indiana, where he was in charge of the development and patent department before entering war service. During most of 1944 he was chief of the contract termination section, eastern procurement district, in New York.

F. B. Bimel, a director of International Petroleum Co., Ltd., since 1928, has been elected a vice president. He has been in the producing and pipe-line branches of the oil industry throughout his business career. **J. A. New,** solicitor to the company, has been named general secretary.

N. C. McGowen, president of United Gas Corp. and associated companies, has been chosen chairman of the Shreveport-Caddo Parish Red Cross War Fund campaign for 1945.

J. H. Bowen, formerly in Seminole, Okla., has been made production superintendent in the Illinois-Indiana-Kentucky area for Midstates Oil Corp., with headquarters in Evansville, Ind.

Vernon B. Chance, formerly vice president and refinery superintendent for Atlas Oil & Refining Co., Shreveport, has been chosen president, succeeding **B. F. Connolly,** who recently resigned. Chance has been in Atlas service 18 years.

Phillips C. Salman, formerly general auditor for Socony-Vacuum Oil Co., Inc., has been appointed assistant comptroller. He takes the place of **F. R. Ficken,** who retired.

Joe E. Arvin has resigned as petroleum engineer for Sohio Producing Co. in the Illinois-Indiana-Kentucky territory to become production superintendent for Dee Brothers and Illinois Mid-Continent Co., Owensboro, Ky.

R. V. Pierce, formerly with The Texas Co. at Houma, La., has joined N. H. Wheless Drilling Co. as district superintendent for east Louisiana and Mississippi with headquarters at Natchez.

C. H. Whitman, manager of crude-oil purchases in Louisiana for Standard Oil Co. of New Jersey, and a member of the company's management committee in Louisiana, has been granted a leave of absence to go to Washington as assistant di-

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TYPE G

- Every individual feature of the MIDCO contributes in some degree to the almost unbelievable results obtained.
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2187042. Other Patents Pending

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rector of the supply and transportation division of Petroleum Administration for War. He will have supervision of pipe-line engineering and construction activities, pipe-line operations and crude-oil supply on a national basis.

Milan G. Arthur, field engineer and geologist of Union Oil Co. of California, has been transferred to Cut Bank, Mont., following the recent purchase of Glacier Production Co. by Union.

D. A. Hulcy, president of the Lone Star Gas Co., last week was elected president of the Dallas Petroleum Club, succeeding **Jake L. Hamon,** partner in the firm of Cox & Hamon. **Fred Mayer,** Continental Supply Co., is the new vice president; **P. N. Wiggins, Jr.,** is secretary, and **D. H. Voss,** Wilson, Steed & Voss, is treasurer. **J. E. Brantly,** president, Drilling & Exploration Co. of America, addressed the meeting on oil prospects in South America.

L. R. Croft, formerly equipment engineer for Stanolind Oil & Gas Co. in Tulsa, has moved to Midland, Tex., to serve as production superintendent for F. A. Callery and associates, of Los Angeles, who have acquired properties in Crane and Crockett counties.

Capt. Jack Samway, a civil engineer for Humble Oil & Refining Co. when he entered war service 3 years ago, has been awarded the Air Medal with three oak-leaf clusters, and the Distinguished Flying Cross. His division led the Eighth Air Force penetration into central Germany to attack vital aircraft factories.

L. L. Smith, Ponca City, formerly assistant superintendent of the Continental Oil Co. refinery there, has been appointed manager of the manufacturing department of Danciger Oil & Refining Co., Tulsa.

W. M. Lourcey has been made manager of the land, leasing and scouting departments, Gulf Oil Corp., Fort Worth division, succeeding **Glenn Garrett,** who will be assigned to other duties.

CALENDAR

April 1945

Midwest Power Conference, eighth annual meeting, Palmer House, Chicago April 9 and 10.

I.P.A.A., midyear directors meeting, New Orleans, La., April 16-18.

October 1945

Texas Mid-Continent Oil and Gas Association, Rice Hotel, Houston, October 4-6

I.P.A.A., annual membership meeting convention city to be selected later. October 15, 16 and 17.

ORBIT VALVES

SAND VS WING VALVES

The ORBIT VENTURI TYPE VALVE is manufactured with Stellite "J" Metal Seats which will not only withstand the abrasion of sand but is also corrosion resistant to all type of crude oil.

ORBIT VENTURI TYPE VALVE

This valve can be furnished thru all fabricators of Xmas Trees or thru any of your local supply stores at a price comparable to that of other leading valves. The Orbit Valve requires no lubrication to effect a seal.

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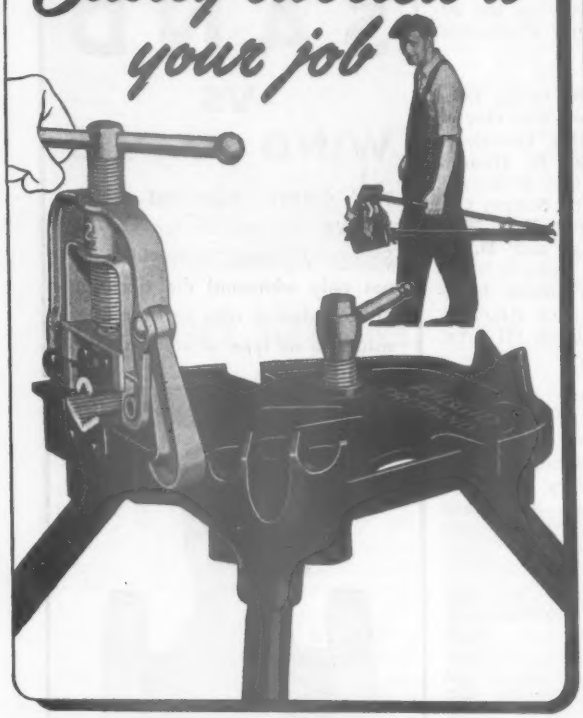

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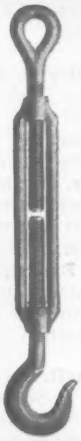

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● Norris Brothers Turnbuckles are made perfectly true by a special straightening process. Ends are tapped in line, assuring true concentric pull. And as for toughness, we've turned them inside out and twisted them into a pigtail braid without a sign of fracture. Made in sizes and types to fit most needs. Ask your supplier, or write for circular.

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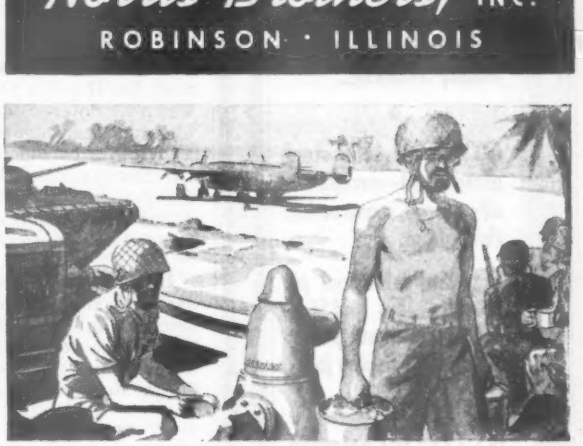

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Next to food, nothing on the battlefront is as refreshing as a cup of cool, pure water. Thousands of Peerless Pumps are on the battlefronts — selected because of their simplicity, compactness, dependability and ease of installation. Here on the home front Peerless Pumps are also serving well, thousands operating 24 hours daily for years, without repair.

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KANSAS

Carroll Pool Opened In Barton County

RAYMOND GEAR 1 Carroll, SW NE SW 21-17-14w, north of the Boyd pool in Barton County, has opened a new pool, given the name of Carroll. Producing from the Arbuckle at 3,356-70 ft., the well has not yet been assigned a potential, although estimates run about 250 bbl. per day.

Ellis County may have a new pool in the making in the Sunray 1 Befort, NE NE SW 11-14-20w, about 1 mile south of the new Pleasant pool. Bottomed in the Arbuckle at 3,876 ft., the well made 1½ bbl. of oil per hour natural. Operators will acidize and continue testing.

Plains Exploration 1 Harbiger, SE NE SW 18-18-9w, southeast of the West Bredfeldt pool in Rice County, found saturation in the Arbuckle and pipe has been set at 3,211 ft. Operators are rigging up standard tools. The Lansing was cut at 2,880 ft., and the Arbuckle at 3,207 ft.

Three oil discoveries were completed this week in Kansas, in Cowley, Saline and Stafford counties. Creekmore & Rooney 1 Seacat, NW NW NW 26-33-4e, in Cowley County, has a potential of 153 bbl. from Mississippi lime. In Saline County, Mouser Drilling et al 1 Carlin, NE SE SW 13-15-3w, has been given a potential of 77 bbl. from the Viola. In Stafford County, Harbor & Ed Swearer 1 Smith, SW SW SW 19-21-11w, rated a potential of 12 bbl. per day from the Arbuckle.

Operations show a decided increase this week with 41 new locations reported. Wildcat starts number 6, with one each scheduled for Barber, Kingman, McPherson, Sedgwick, Stafford, and Stanton counties.

KANSAS WILDCAT COMPLETIONS

Cowley County: Creekmore & Rooney 1 Seacat, NW NW NW 26-33-4e, potential 153 bbl. of 41° gravity oil from pay zone 3,098-3,113 ft., TD 3,113 ft., Kansas City 2,370 ft., Mississippi lime 3,093 ft.

Greenwood County: Glen Smith 1 Red Ranch, NE NE NE 13-23-8e, dry, TD 2,590 ft., Mississippi lime 1,871 ft.

Kingman County: Magnolia 1 Callahan, NW SE SE 13-28-9w, dry, TD 4,548 ft., Arbuckle 4,515 ft.

Norton County: B. & R. Drilling 1 Scott, NE NE NE 23-2-23w, dry, TD 3,666 ft., Reagan 3,653 ft.

Pratt County: Skelly 1 Moore, NW SE NE 6-29-13w, dry, TD 4,670 ft., Arbuckle 4,644 ft.

Russell County: Kiowa Drilling et al 1 Dewald, NE SW SW 31-15-15w, dry, TD 3,476 ft., Arbuckle 3,560 ft.

Joe Aylward 1 Mares, NW NW NE 13-15-11w, dry, TD 3,308 ft., Arbuckle 3,291 ft.

Saline County: Westgate Greenland 1 Shank, NE NE NE 19-13-3w, dry, TD 3,819 ft., Arbuckle 3,748 ft.

Mouser Drilling et al 1 Carlin, NE SE SW 13-15-3w, potential 77 bbl. of 35° gravity oil from pay zone 3,256-3,323 ft., TD 3,505 ft., Viola 3,258 ft., Simpson 3,408 ft., Arbuckle 3,475 ft.

Anderson-Prichard 1 Olssen, NW NW SW 14-15-1w, dry, TD 3,196 ft., Viola 3,154 ft.

Stafford County: Harbor & Ed Swearer 1 Smith, SW SW SW 19-21-11w, potential 12 bbl. per day from pay zone 3,550-56 ft., TD 3,556 ft., Conglomerate 3,490 ft., Simpson 3,503 ft., Arbuckle 3,548 ft.

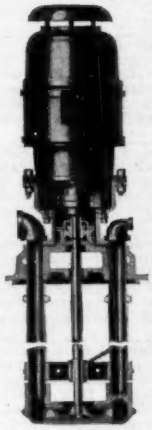
Sumner County: R. L. Carnaham 1 Parker, NE NE SE 7-30-2e, dry, TD 3,650 ft., Arbuckle 3,606 ft.

Inverted Inlet Pump Efficiently Handles De-coking Operations

The problem of pumping the highly abrasive coke-laden water from hydraulic de-coking of vertical chambers has been solved by one midwestern refiner with Amsco-Nagle type "SW" vertical shaft wet pit inverted inlet pumps, fitted with manganese steel water end parts.

on the right serves as the discharge pipe. Manganese steel water end parts are used to combat the abrasive effects of the coke. Other materials are available to meet various corrosive or abrasive conditions

This pump has many features that recommend it for de-coking units. The inverted inlet eliminates gas or air binding and causes hydraulic thrust to counterbalance the weight of moving parts. Wide impeller clearances permit the passage of sizable pieces of coke, thus increasing the material handling efficiency of the pump. Steady and intermediate sleeve bearings are supported in split yokes and may be replaced without dismantling the pump. The tubular structural members serve a dual purpose. The one on the left in the cutaway view serves as a duct for lubricants and the one in both horizontal and vertical type Amsco-Nagle pumps.



P163N — A 5" type "SW", frame 14 inverted inlet Amsco-Nagle pump, similar to those used in de-coking operations. Note fittings for lubricating steady and intermediate bearings from floor level.

A-125 — Cutaway view of type "SW" pump, used in hydraulic de-coking. Note the inverted inlet.

The many features of these soundly engineered pumps are described in Bulletin 940, sent on request.

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AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Illinois
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FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO.
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ENGINEERS: Preferably with chemical background. For technical sales work on chemicals dealing with aviation gasoline and oil refinery work. Experience preferred —plant production, laboratory work in the petroleum, lubricant, or similar industries. Age between 25-40 years. Dependable, good personality. Box A-391, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED by consulting organization: Petroleum engineers with Hayward mud logging experience or its equivalent. Immediate openings in Venezuela, excellent opportunity for advancement to managerial positions throughout the world. Box A-290, The Oil and Gas Journal, Tulsa, Okla.

WANTED: MECHANICAL ENGINEER who knows something about drafting. John Zink Company, 4401 South Peoria, Tulsa, Oklahoma.

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For Process Piping on
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PUMP APPLICATION ENGINEER Ex-Service Man, sales engineering or engineering background preferred. Post-war future. State age, experience, salary expected. Openings Tulsa and Houston. Box A-411, The Oil and Gas Journal, Tulsa, Oklahoma.

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FOUR men with experience in instrumentation—Flow-meters, Temperature Controls, Potentiometers. War essential industry. Employment under rules of WMC. Carries highest priority. Central southeast location. Box A-414, The Oil and Gas Journal, Tulsa, Oklahoma.

OLD established Kentucky oil well supply house wants experienced man who knows second-hand business. Give experience, references and salary expected. Box A-417, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS WANTED: Graduate Ch.E., M.E., or E.E., 20 to 29 years of age, having refinery or laboratory experience. Essential industry with post-war continuance. State education, experience, salary expected, and date of availability. P. O. Box 2546, Houston 1, Texas.

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Limited number desirable positions open in Saudi Arabia:

Petroleum, electrical and mechanical engineers; radio operators and technicians; Diesel and tractor mechanics; air-conditioning and refrigeration mechanics; stabilizer operators; utility operators; surveyors; accountants; stenographers; typists. Employment offers splendid opportunities for post-war security and advancement. Liberal benefit plans; vacations in United States; free hospital and medical care. If genuinely interested in foreign career, send full information on experience, transcript of college record (professional applicants only), references, draft and availability status to our Relations Department.

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CHEMICAL ENGINEER WANTED: Chemist or Chemical Engineer with Bachelor's Degree wanted to supervise essential natural gas processing plant laboratory. Southwest location. Should have several years experience refinery or larger natural gasoline plants. Submit complete details education, experience, personal data, salaries received and expected, recent photo. Employment subject to W.M.C. regulations. Box A-381, The Oil and Gas Journal, Tulsa 1, Oklahoma.

MECHANICAL ENGINEER, leading manufacturer of drilling and production tools, located in Southern California, has opening for man, 25-45, pref. M.E. degree, should have had some experience in design and/or oil field operation. We sincerely believe this to be a worthwhile opportunity for the right man. Salary will be in line with past record and ability. Write fully giving outline of personal data and experience for past ten years. Enclose small photo if possible. Box A-393, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

TWENTY years, experience in operations, topping, cracking, gas compression and recovery, light ends fractionation, light and heavy treating. Have statement of availability. South or west. Box A-365, The Oil and Gas Journal, Tulsa, Oklahoma.

Aggressive, experienced, production man desires connection in oil production or selling activity in Tulsa area. Have law degree and can handle title work. Early forties, 4-HA. Box A-384, The Oil and Gas Journal, Tulsa, Oklahoma.

FIELD Superintendent. Draft exempt. Twenty-three years experience—last ten as field superintendent and assistant manager. Thoroughly familiar with drilling and production work. Now employed. Desires connection with aggressive Mid-Continent operator. Engineering graduate. Sober. Industrious. Box A-410, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE, oil country equipment, with manufacturing, engineering and sales background, seeks connection. Would purchase interest. Best references furnished. Address Box A-409, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: 19 years general experience in production. Past five years as engineer. Age 40, available. Box A-402, The Oil and Gas Journal, Tulsa, Oklahoma.

REGISTERED CIVIL ENGINEER and Graduate Geologist. Age 38. Experienced in supervision of design, layout, construction and field engineering; land work. Desires position of responsibility. Immediately available. Box A-394, The Oil and Gas Journal, Tulsa, Oklahoma.

MANUFACTURERS and Distributors of oilfield machinery, specialties, equipment and supplies. Do you want representation in Texas Gulf Coast with Houston as headquarters? Can furnish any reference as to my knowledge, ability and integrity and successful sales record. Well acquainted with the supply house personnel and specialty men, purchasing agents, buyers, engineers, superintendents and others with the oil companies, drilling, workover and other contractors and independent operators in this section. Wish to secure representation on a drawing account commission basis. Address Box A-412, The Oil and Gas Journal, Tulsa, Oklahoma.

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CONSTRUCTION SUPERINTENDENT
Graduate Engineer; 21 years general experience with top ranking contracting Engineers and Constructors; also, major oil companies on all types of refinery units, and pipe line projects both domestic and foreign. Excellent organizer, very efficient, and a broad acquaintance in the construction field and associated industries. Desire to make a change which would be mutually advantageous. 43 years of age; experience acquired "the hard money way." Box A-408, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

SITUATION wanted as repairman in a gasoline plant or refinery or as lease pumper. Thirty years experience in this work. Now employed. Due to wife's health must locate elsewhere. Would like to locate in Oklahoma, West Texas, or New Mexico. Age 48, married, excellent health and reliable. Box A-415, The Oil and Gas Journal, Tulsa, Oklahoma.

MAN age 38 available for production supt. Capable. 20 years field experience. Technical background. Box A-407, The Oil and Gas Journal, Tulsa, Oklahoma.

INSTRUMENT Engineer, age 34, 14 years experience. Majority of this time spent in oil refinery construction and maintenance. 1½ years foreign construction experience. Can handle instrumentation from any angle. Electrical or pneumatic controls. Prefer foreign construction work. Available about March 1. Box A-401, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY executive of 17 years experience in processing petroleum products, desires employment in managerial capacity with small refinery in Southwest area. Box A-404, The Oil and Gas Journal, Tulsa, Oklahoma.

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FOR SALE — MAPS

MAP showing OIL and GAS fields and Structures of ALBERTA, CANADA, from international boundary to latitude 56 30' including outlines of principal lease plays, topographical features, cities, towns, highways, trails and railways. Scale: 1"-16 Mi. Vandyke prints: $10.00 U. S. funds. Copyright by:

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WANTED: REPAIRABLE 50 to 350 3½-inch Hydril twin pins to fit 3½ O.D. internal flush external upset drill pipe. Standard Oil Field Supply Co., Houston, Texas. Telephone Preston 8271, L.D. 2195.

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Tel. GArfield 0600

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WOULD buy a spudder, 45 Special Star or 55 Wichita Falls or a large Fort Worth, without tools. Box A-416, The Oil and Gas Journal, Tulsa, Oklahoma.

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Unlimited quantity of Structural Steel — Pipe — Tubing Casing and Valves, all sizes

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Kansas City (18), Kansas

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2—12x12 AJAX Steam Engines enclosed, RB Type complete with steam separators, A-1 condition. Inquire T. T. Eason and Company, Enid, Oklahoma.